Cuyahoga County BF Haz. Sub. & Petro. Assess. Coalition Grant- B&N QAPP conditional approval and comments

Jan Pels to: Karla Auker, Janise Bayne, mhaney, Tmignery 03/15/2012 03:09 PM
Bcc: Jan Pels

From: Jan Pels/R5/USEPA/US
To: Karla Auker/R5/USEPA/US@EPA, "Janise Bayne" <jbayne@cuyahogacounty.us>, mhaney@burnip.com, Tmignery@burnip.com
Bcc: Jan Pels/R5/USEPA/US

All:
I've reviewed the subject QAPP, which looks pretty good, and which is conditionally approved as of today, conditional upon receipt of revisions within ~ 2 weeks! Comments are listed below! Please send revised pages only and once we receive the revisions, we'll email the final completed signature page to everyone!

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Thanks for your work on this!

Jan Pels
Phone: (312) 886-3009
FAX: (312) 692-2161
U.S. EPA
77 W. Jackson, Mail code SB-7J
Chicago, IL 60604

QUALITY ASSURANCE PROJECT PLAN APPROVAL SHEET
U.S. EPA BROWNFIELDS ASSESMENT COALITION GRANT -
HAZARDOUS SUBSTANCE AND/OR PETROLEUM
CUYAHOGA COUNTY DEPARTMENT OF DEVELOPMENT –
CUYAHOGA COUNTY, OHIO
AWARD DATE: SEPTEMBER 2009

On behalf of the Cuyahoga County Department of Development, this Quality Assurance Project Plan (QAPP) was prepared by Burgess & Niple, Inc. (B&N) for the Brownfields Assessment Coalition Grant. The QAPP was developed following the guidance presented in the U.S. Environmental Protection Agency (EPA) document QA/R-5 (dated March 2001, reissued May 2006).

Alan Baumann for
Karla Auker, U.S. EPA Project Manager

J Pels 3/15/12
Jan Pels, U.S. EPA QA Reviewer

Janise Bayne
Janise Bayne, Cuyahoga County Department of Development Project Manager

Melissa J Haney
Melissa Haney, B&N Project Manager

Julie Carpenter
Julie Carpenter, B&N QA Manager

Kenneth Hunt
Kenneth Hunt, Pace, Laboratory Project Manager

QUALITY ASSURANCE PROJECT PLAN APPROVAL SHEET

U.S. EPA BROWNFIELDS ASSESMENT COALITION GRANT -

HAZARDOUS SUBSTANCE AND/OR PETROLEUM

CUYAHOGA COUNTY DEPARTMENT OF DEVELOPMENT –

CUYAHOGA COUNTY, OHIO

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Alan Bauman for

Karla Auker, U.S. EPA Project Manager

J Pels 3/15/12

Jan Pels, U.S. EPA QA Reviewer

Janise Bayne

Janise Bayne, Cuyahoga County Department of Development Project Manager

Melissa Haney

Melissa Haney, B&N Project Manager

Julie Carpenter

Julie Carpenter, B&N QA Manager

Kenneth Hunt

Kenneth Hunt, Pace, Laboratory Project Manager

Cuyahoga County BF Haz. Sub. & Petro. Assess. Coalition Grant- B&N QAPP Rec'd... need...

Jan Pels to: mhaney 02/14/2012 01:52 PM

Cc: "Janise Bayne", Karla Auker

Bcc: Jan Pels

From: Jan Pels/R5/USEPA/US

To: mhaney@burnip.com

Cc: "Janise Bayne" <jbayne@cuyahogacounty.us>, Karla Auker/R5/USEPA/US@EPA

Bcc: Jan Pels/R5/USEPA/US

Melissa:

I received the subject QAPP today, and noted that the signature page is not completed. Please route the signature page and email or mail it to me soon, so we have this to sign off on when the QAPP is approved!

Also, if you have not started routing the signature page, please add that this is an 'Assessment Coalition' grant, since it's a specific type of assessment grant. I have written this on the cover page to the QAPP, and this will need to be revised in the introduction section, since it is not a $400,000 grant, but a $1 mil 'assessment coalition' grant. The introduction should probably include who all of the coalition member communities are, and state that the County is the member that received the grant and that they will implement/manage this coalition grant.

I will likely have other comments, but at least wanted to let you know about the signature page so that it can be corrected before it's routed... if it's already being routed, we can write or type in the 'coaltion' part!

Thanks!

Jan Pels
Phone: (312) 886-3009
FAX: (312) 692-2161
U.S. EPA
77 W. Jackson, Mail code SB-7J
Chicago, IL 60604

BURGESS & NIPLE

Burgess & Niple, Inc.
5085 Reed Road
Columbus, OH 43220
614.459.2050
Fax 614.451.1385

LETTER OF TRANSMITTAL

DATE: February 10, 2012 JOB NO.:
RE: QAPP for Cuyahoga County Department of Development – Revision O

TO: Ms. Jan Pels
Quality Assurance Reviewer
U.S. EPA – Region 5
77 W. Jackson Boulevard
Chicago, Illinois 60604-3590

WE ARE SENDING YOU: [X] Attached [ ] Under separate cover via______ the following items:

[ ] Shop drawings [ ] Prints [ ] Plans [ ] Samples [ ] Specifications
[ ] Copy of letter [ ] Change order [ ] ______________________

COPIES	DATE	NO.	DESCRIPTION
1	Feb 2012	Rev0	Cuyahoga County DOD QAPP – Rev. 0 for review and approval.
			What grant?
			2009 Haz Sub $1 mil
			Coalition gnt

[X] For Approval [ ] Approved as submitted [ ] Resubmit ______ copies for approval
[X] For your use [ ] Approved as noted [ ] Submit ______ copies for distribution
[ ] As requested [ ] Returned for correction [ ] Return ______ corrected prints
[X] For review and comment [ ] ______________________

REMARKS:
Jan:
Please review the attached QAPP for the Cuyahoga County Department of Development. Please note the signed signature page will follow.

COPY TO:
-Janise Bayne, CCDOD, w/out attachments
-Kenneth Hunt, Pace Analytical, w/attachments (CD only)
-Melissa Haney, B&N, w/attachments

SIGNED: Michael Akins
Michael Akins, Geologist

If enclosures are not as noted, kindly notify us at once.

BURGESS & NIPLE

5085 Reed Road | Columbus, OH 43220 | 614.459.2050

Ms. Jan Pels
U.S. EPA Region 5
77 W. Jackson Boulevard
Chicago, Illinois 60604-3509

RE: Revision 1 of B&N's QAPP for the Cuyahoga County Department of Development

March 23, 2012

Dear Ms. Pels:

Burgess and Niple, Inc. (B&N), on behalf of the Cuyahoga County Department of Development, is submitting Revision 1 of our Quality Assurance Project Plan (QAPP) for the United States Environmental Protection Agency (EPA) Brownfields Assessment Coalition Grant for Hazardous Substances & Petroleum for Cuyahoga County, dated March 2012. The revisions were based on comments included in your email sent on March 15, 2012 regarding Revision 0 of the QAPP. A copy of your email has been attached to this letter for reference.

Below is a list of instructions to amend your current version (Revision 0) of the Cuyahoga County Department of Development QAPP.

1. Replace the QAPP cover page, spine, and text with Revision 1. Please do not discard Figure 1 (page 2 of the text for Revision 0) because it was not edited, however please note Figure 1 is now page 3 of Revision 1.
2. Replace the first page of Table 3a and the second page of Table 3b with Revision 1.
3. Replace Table 5 with Revision 1.
4. Insert the Florida Department of Health NELAP Accreditation for Pace Analytical Services, Inc. – Green Bay Wisconsin laboratory.
5. Replace the ALS – Cincinnati, Ohio and TestAmerica – North Canton, Ohio certificate for the Ohio Voluntary Action Program (VAP).
6. Replace B&N's Master List Standard Operating Procedure (SOP) (Revision 4) and B&N's Soil Sampling SOP (Revision 11).
7. Insert Dick Thomas' B&N resume.

Please note only Summa canisters will be used to collect volatile organic compound (VOC) air samples.

If you have any questions please contact me at (614) 459-2050 ext. 1323.

Sincerely,

Michael Akins,
Geologist

Copy w/attachments: Janise Bayne, Cuyahoga County Department of Development (CD Rom only).
Kenneth Hunt, Pace Analytical Services, Inc., Indianapolis, Indiana (CD Rom only)
Melissa Haney, B&N

Akins, Mike

From: Mignery, Tom
Sent: Friday, March 16, 2012 8:18 AM
To: Akins, Mike
Cc: Haney, Melissa
Subject: FW: Cuyahoga County BF Haz. Sub. & Petro. Assess. Coalition Grant- B&N QAPP conditional approval and comments

fyi

From: Jan Pels [mailto:Pels.Jan@epamail.epa.gov]
Sent: Thursday, March 15, 2012 4:09 PM
To: Karla Auker; Janise Bayne; Haney, Melissa; Mignery, Tom
Subject: Cuyahoga County BF Haz. Sub. & Petro. Assess. Coalition Grant- B&N QAPP conditional approval and comments

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Jan Pels
Phone: (312) 886-3009
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U.S. EPA
77 W. Jackson, Mail code SB-7J
Chicago, IL 60604

Quality Assurance Project Plan - Revision 1

U.S. EPA Brownfields Hazardous Substance & Petroleum Assessment Coalition Grant

Cuyahoga County, Ohio

(February 2012 - Revision 0)
March 2012 - Revision 1

Prepared for:
Cuyahoga County Department of Development

Prepared by:
Burgess & Niple, Inc.

BURGESS & NIPLE
Engineers ■ Environmental Scientists

Quality Assurance Project Plan – Revision 1

U.S. EPA Brownfields Hazardous Substance & Petroleum Assessment Coalition Grant

Cuyahoga County, Ohio

Prepared for:

Cuyahoga County Department of Development

Prepared by:

Burgess & Niple, Inc.

~~February 2012 – Revision 0~~
March 2012 – Revision 1

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HAZARDOUS SUBSTANCE AND/OR PETROLEUM
CUYAHOGA COUNTY DEPARTMENT OF DEVELOPMENT –
CUYAHOGA COUNTY, OHIO
AWARD DATE: SEPTEMBER 2009

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____

Karla Auker, U.S. EPA Project Manager

____

Jan Pels, U.S. EPA QA Reviewer

____

Janise Bayne, Cuyahoga County Department of Development Project Manager

____

Melissa Haney, B&N Project Manager

____

Julie Carpenter, B&N QA Manager

____

Kenneth Hunt, Pace, Laboratory QA Manager

QUALITY ASSURANCE PROJECT PLAN DISTRIBUTION LIST

The following have received a copy of this Quality Assurance Project Plan:

Jan Pels, U.S. EPA QAPP Reviewer, (312) 886-3009, pels.jan@epa.gov

Karla Auker, U.S. EPA Project Manager, (440) 250-1741, Auker.Karla@epa.gov

Janise Bayne, Cuyahoga County Department of Development, (216) 698-2574, jbayne@cuyahogacounty.us

Melissa Haney, B&N Project Manager, (330) 376-5778, melissa.haney@burgessniple.com

Julie Carpenter, B&N QA Manager, (614) 459-2050, julie.carpenter@burgessniple.com

Kenneth Hunt, Pace, Laboratory Project Manager, (317) 875-5894, kenneth.hunt@pacelabs.com

ACRONYM LIST

ACM – Asbestos Containing Material
AHERA – Asbestos Hazard Emergency Response Act
ASTs – Aboveground Storage Tanks
ASTM – American Society for Testing and Material
B&N – Burgess & Niple, Inc.
CFR – Code of Federal Regulations
CNS – Covenant Not to Sue
COC – Chain of Custody
CSM – Conceptual Site Model
DAR – Data Assessment Report
DI – Deionized
DO – Dissolved Oxygen
DQA - Data Quality Assessment
DQOs – Data Quality Objectives
DRO – Diesel-Range Organic Compounds
DVR – Data Validation Report
EM – Electromagnetic
EPA – Ohio Environmental Protection Agency
ESA – Environmental Site Assessment
GPR – Ground Penetrating Radar
GRO – Gasoline-Range Organic Compounds
HASP – Health and Safety Plan
HHRA – Human Health Risk Assessment
HUD – U.S. Department of Housing and Urban Development
IAs – Identified Areas
LCSs – Laboratory Control Samples
MCL – Maximum Contaminant Level
MDLs – Method Detection Limits
ml - milliliter
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NFA – No Further Action
O&M – Operation and Maintenance
OAC - Ohio Administrative Code
Ohio EPA – Ohio Environmental Protection Agency
OSHA – Occupational Safety and Health Administration
oz - ounce
PAHs - Polynuclear Aromatic Hydrocarbons
PARCCS – Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity
PCBs – Polychlorinated Biphenyls

PE – Performance Evaluation
PID – Photoionization Detector
POC – Point of Compliance
PPE – Personal Protective Equipment
PQL - Practical Quantitation Limits
QA – Quality Assurance
QAPP – Quality Assurance Project Plan
QA/QC – Quality Assurance/Quality Control
QC – Quality Control
QLs – Quantitation Limits
RAP – Remedial Action Plan
RECs – Recognized Environmental Conditions
RPD – Relative Percent Difference
RSD – Relative Standard Deviation
SAP – Sampling and Analysis Plan
SOPs – Standard Operating Procedures
SRMs - Standard Reference Materials
SVOCs – Semivolatile Organic Compounds
TPH – Total Petroleum Hydrocarbons
U.S. EPA – United States Environmental Protection Agency
UPUS - Unrestricted Potable Use Standards
USTs – Underground Storage Tanks
VAP – Ohio Voluntary Action Program
VOA - Volatile Organic Analysis
VOCs – Volatile Organic Compounds

INTRODUCTION

The purpose of this document is to describe the personnel, procedures, and methods for ensuring the quality, accuracy, and precision of data associated with the Northcoast Brownfield Coalition (Coalition) Brownfield Assessment Project. The Coalition consists of the Cuyahoga County Board of Commissioners through their Department of Development, the city of Cleveland through their Department of Economic Development, and the Cleveland-Cuyahoga Port Authority. The Coalition received a $1 million U.S. Environmental Protection Agency (U.S. EPA) Brownfield Assessment Coalition Grant for hazardous substances and petroleum. The Cuyahoga County Department of Development is the lead coalition member that manages the grant. The purpose of this grant is to assess properties potentially impacted by hazardous substances and/or petroleum. Following the procedures outlined in this Quality Assurance Project Plan (QAPP) will ensure that the data collected meets the project objectives. This QAPP will be valid for the duration of the grant/contract/cooperative agreement, and it will be reviewed annually (from the date of EPA approval) to insure that it is up to date throughout the life of the grant/contract/cooperative agreement. This annual review will be documented (letter format is ok) and sent to all recipients of the QAPP with any updated materials (current laboratory certificates, resumes for new key staff, etc.) to insert into the QAPP. If substantial changes are anticipated during the project period (new laboratories, additional analyses, new field methods, etc.), a call will be arranged with all parties that reviewed this QAPP to determine how to revise this document.

1.0 PROJECT MANAGEMENT

1.1 Project Organization and Responsibility

Figure 1 presents the organizational structure for the Cuyahoga County Department of Development Brownfields Assessment Project. All lines of communication, management activities, and technical direction within this project team will follow this organization arrangement. Any directions or communications from the U.S. EPA will be given to the Cuyahoga County Department of Development Project Manager. The Cuyahoga County Department of Development Project Manager will subsequently communicate directions to the

Burgess & Niple, Inc. (B&N) project manager. The U.S. EPA project manager will be notified of all proposed changes in personnel.

Figure 1 – Project Organization Chart

Responsibilities of key project personnel are outlined below.

U.S. EPA Project Manager

1. Direct, review, and approve QAPP and Sampling and Analysis Plans (SAPs).
2. Provide technical consultation services to the Project Manager and B&N project manager.
3. Review progress reports detailing work accomplished.
4. Review all final reports.

U.S. EPA Quality Assurance Reviewer

1. Review and approve the QAPP.
2. Assist in review of the SAPs.

Cuyahoga County Department of Development Project Manager

1. Direct project activities.
2. Prepare and submit progress reports detailing work accomplished, funds spent, and the project status.
3. Responsible for review of project deliverables, development of project planning, and the overview of project strategies.
4. Review property report for consistency with objectives stated in work plan.
5. Provide final signature on the assessment.

B&N Project Manager

1. Responsible for planning, coordinating, monitoring, and evaluating of project field activities.
2. Before sampling, meet with the Project Engineer, quality assurance (QA) manager, and field staff to discuss and establish sampling purposes, sampling methodology, number of samples, size of samples, sample preservation methods, chain-of-custody (COC) requirements, analyses required, and which samples will be duplicated in the field.

3. Resolve technical problems.
4. Meet with team members to discuss and review analytical results prior to completion of reports.
5. Responsible for environmental reports and documents.

B&N Quality Assurance Manager

1. Oversee assessment activities to ensure that sampling methodology, sample preservation methods, and COC procedures are being followed.
2. Assist in any QA issues with field or laboratory questions, as needed.
3. Conducts Field Audits.
4. Maintain a record of samples submitted to the laboratory, the analyses being performed on each sample, the final analytical results, and data validation reports.
5. Prepares Data Assessment Report (DAR).
6. Annual review of QAPP.

B&N Data Manager

1. Maintain a record of all samples collected and the sample identification information on each sample.
2. Manage data acquired from field assessments and laboratory analyses.
3. Assemble data into computer format.

B&N Field Team Leader

1. Complete on-site Health and Safety Plan (HASP) for the property.
2. Complete a SAP for the property to be investigated prior to any field activities.
3. Be responsible for oversight of field activities and ensure that procedures for the field activities related to the QAPP are executed and documented properly.
4. Submit data generated during field assessment to the data manager.
5. Procuring, coordinating and qualifying all subcontractors.

B&N Field Technical Staff

1. Before sampling, meet with B&N project manager to discuss and establish sampling purposes, sampling methodology, number of samples, size of samples, sample preservation methods, COC requirements, analyses required, and which samples will be duplicated in the field.
2. Be responsible for collection of equipment needed for property assessment work, which would include personal protective equipment (PPE), sampling equipment, sample containers and coolers, water-level meters, monitoring devices, and any other equipment deemed necessary.
3. Oversee drilling and soil boring work to ensure that proper procedures are followed during monitoring well installation and soil sample collection from borings.
4. Monitor hazardous conditions while conducting field operations.
5. Submit COC records and field paperwork to field team leader.

Pace Analytical Services, Inc. (Pace) Project Manager

1. Responsible for samples submitted to Pace, including those released to a subcontracted laboratory.
2. Responsible for summarizing quality assurance/quality control (QA/QC) requirements for the project, including those samples analyzed by subcontracted laboratories.
3. Maintain laboratory schedule and ensure that technical requirements are understood by laboratory personnel.
4. Provide technical guidance to B&N project manager.
5. Ensure accuracy of the laboratory data.

Pace QA Manager

1. Responsible for evaluating adherence to policies and ensuring that systems are in place to provide QA/QC as defined in the QAPP.
2. Initiate and oversee audits of corrective action procedures.
3. Perform data reviews.
4. Maintain documentation of training.

Karla Auker will serve as the U.S. EPA project manager. The U.S. EPA QAPP reviewer will be Jan Pels. Janise Bayne is with the Cuyahoga County Department of Development and will oversee this project.

Melissa Haney will serve as the B&N project manager. Julie Carpenter will serve as the B&N QA manager. The B&N data manager and the B&N field team leader will be Melissa Haney. The field technical staff includes Michael Akins, Craig Botley, Richard Thomas, David Walker, and Jennifer Walker although other supporting staff from B&N may be assigned on an as-needed basis. Resumes for proposed B&N personnel are included in **Appendix A**.

All B&N site personnel will be trained as mandated by the Occupational Safety and Health Administration (OSHA) Act regulations (29 Code of Federal Regulations [CFR] 1910.120). Additionally, all site personnel will be properly trained in the procedures for collecting, labeling, packaging, and shipping of liquid and solid environmental samples. Persons conducting asbestos surveys will be certified by the Ohio Department of Health (ODH). The B&N project manager will maintain personnel training records. Field personnel will be trained to use all monitoring devices and other equipment used in the field.

The laboratory selected for the majority of the analytical work required for this project is Pace located in Indianapolis, Indiana. Pace has been certified under the Voluntary Action Program (VAP), which is administered by the State of Ohio. Pace's Ohio VAP certification number for their Indianapolis, Indiana laboratory is CL0065. As an Ohio VAP-certified laboratory, Pace has undergone performance evaluations administered by the State of Ohio for method accuracy and precision. These evaluations meet the standards required by U.S. EPA. Karl Anderson is the Pace laboratory director. Kenneth Hunt will serve as the Pace project manager. He will be ultimately responsible for ensuring the quality of the laboratory data. The Pace QA Manager will be Beth Schrage.

For analysis of asbestos containing materials (ACM), EMLab P&K, LLC (EMLab) located in San Bruno, California will do the analyses. They are NVLAP (National Voluntary Laboratory Accreditation Program) certified.

The drilling subcontractor has not yet been selected for this project. However, all on-site drilling personnel shall have completed the applicable OSHA training. Additionally, drilling personnel will be required to comply with all site safety regulations covered in the site-specific HASP, provided under separate cover to this QAPP.

In the event a geophysical survey is required, a geophysical survey contractor will be subcontracted by B&N to complete the geophysical survey using Electromagnetic (EM) profiling and Ground Penetrating Radar (GPR). The EM profiling will make two measurements. One, a soil electrical conductivity which profiles the subsurface terrain, and, two, a metal sensitive response which will identify any buried metal objects. The GPR will be used to fine tune the EM survey where anomalies exist. The GPR can provide the depth and shape of subsurface objects as well as relative soil type. All on-site geophysical survey personnel shall comply with all site specific HASP requirements. B&N personnel will oversee and assist any geophysical survey conducted.

1.2 Facility History/Background Information

The Cuyahoga County Department of Development Brownfield Assessment Grant is a community wide project, meaning that specific sites have not been identified for the Phase I and Phase II Property Assessments. Therefore, once the brownfield sites have been identified for Phase II work, property-specific information will be provided within the SAPs.

1.3 Project Description and Schedule

The Coalition consists of the Cuyahoga County Board of Commissioners through their Department of Development, the city of Cleveland through their Department of Economic Development, and the Cleveland-Cuyahoga Port Authority. The Coalition received a $1 million U.S. EPA Brownfield Assessment Coalition Grant for hazardous substances and petroleum. The Cuyahoga County Department of Development is the lead coalition member that manages the grant. The purpose of this grant is to assess properties potentially impacted by hazardous substances and/or petroleum. The Coalition has a list of potential brownfield sites to be evaluated consisting of hazardous substances and/or petroleum contamination, and will prioritize the sites based on site eligibility, access to the properties, potential environmental issues, and redevelopment potential. Based on the distribution of Cuyahoga County's previous U.S. EPA assessment grants, it is anticipated that 60% of the funds will be spent in the City of Cleveland, 30% throughout the remainder of Cuyahoga County and 10% in the Port's proposed International Trade District. The sites with the highest priorities will have Phase I and Phase II Environmental Site Assessments (ESAs) conducted as described in the cooperative agreement to understand the extent of environmental problems on a property. Once the ESAs are completed, the Coalition will pursue cleanup and redevelopment, which is not part of these grant projects.

The Phase I and Phase II ESAs are designed to provide the Coalition and the U.S. EPA with data to facilitate potential redevelopment of each property investigated. These data will be used to determine whether there is a threat from potential contaminants, solutions for any remedial activities, and estimated costs for site redevelopment. The Phase I ESA is predominantly a fact-finding investigation. The Phase II ESAs may consist of one or more of the following tasks:

- Collection and analysis of soil samples
- Collection and analysis of sediment samples
- Collection and analysis of groundwater samples
- Collection and analysis of surface water samples
- Collection and analysis of ACM and lead-based paint (LBP), potentially
- Installation of groundwater monitoring wells
- Aquifer testing and evaluation of aquifer characteristics
- Test pits or trenching
- Evaluation of geophysical survey results
- Evaluation of natural bioattenuation processes
- Evaluation of active remedial technologies.

Details of the property-specific sampling activities will be addressed in the individual SAPs. The findings of each Phase II will be presented in a Phase II ESA report, which is discussed in later sections of this QAPP.

B&N estimates that it will take approximately 3 to 7 months to perform a Phase II for each property. In general, it will take 1 to 2 weeks to prepare an SAP and HASP, 3 to 10 weeks to perform fieldwork including laboratory analyses, 4 weeks to gather any additional necessary data, and 4 to 6 weeks to prepare a Phase II report. The time is dependent on field conditions and laboratory data requirements. Once all of the assessments are complete, the Phase II ESA report will be prepared. **Table 1** (located at the end of the QAPP) presents an example of an estimated time frame for a project.

For the project schedule, please note that Phase I ESAs and Phase II ESAs may be conducted concurrently for different sites. The Phase I and Phase II work will not follow in succession. Based on an ongoing evaluation of Project Name's Brownfield program and the priorities established by the Project Name Brownfield Task Force, additional properties may have Phase I ESAs started while Phase II activities have already begun on other properties.

An Ohio VAP-certified laboratory will be used to ensure overall analytical quality. Pace will be the primary laboratory used for lab analyses. Copies of their VAP certificates are included in **Appendix B**.

1.4 Data Quality Objectives (DQOs)

DQOs are qualitative and quantitative statements that clearly state the objective of a proposed project, define the most appropriate type of data to collect, determine the appropriate conditions for data collection, and specify acceptable decision error limits that establish the quantity and quality of data needed for decision making. The DQOs are based on the use of the data that will be generated. Different data uses may require different quantities of data and levels of quality.

1.4.1 Analytical Quality Objectives

Analytical quality objectives are used to ensure that the analysis will accurately and adequately identify the contaminants of concern, and to ensure that the analysis selected will be able to achieve the quantitation limits (QLs) less than or equal to the target cleanup levels.

1.4.1.1 **Field Screening**

Field-screening instruments provide a lower quality of analytical data compared to laboratory equipment in a controlled environment. However, field methods provide rapid "real-time" results for field personnel in order to help guide field decision-making processes. These techniques are often used for health and safety monitoring, initial site characterization to locate areas for detailed assessment, and preliminary comparison of remedial objectives. This type of field-screening data can include measurements of pH, temperature, conductivity, turbidity, or similar monitoring data. Field measurements of pH, temperature, conductivity, and turbidity will be collected during groundwater sampling activities. During sampling and other property assessment activities, the breathing space of site personnel will be monitored for the presence of organic vapors using a photoionization detector (PID) and possible methane and explosive gases using a *Landtec® Gem-2000* (GEM-2000) gas monitoring meter. The PID will also be used to perform field screening of soil samples in order to assist in the selection of samples to be submitted for laboratory analysis. Generally, the soil interval with the highest PID readings at a boring or sampling location will be submitted to the laboratory. If no volatile organic vapors are detected by the PID, samples will be selected for laboratory analysis based on the following:

- Obvious discoloration, odor, or other visible signs of contamination.

- If no visible or odorous signs of contamination are evident, a sample from the zone directly above the water table will be submitted.

- A sample from a depth corresponding to the zone in the subsurface expected to contain the greatest concentration of contaminants will be submitted. This selection will be based on the type of release and the history of the area being investigated and will be determined by the B&N project manager.

1.4.1.2 **VAP Analyses**

The Cuyahoga County Department of Development may wish to obtain a Covenant Not to Sue (CNS) from the Ohio Governor's office once a Certificate of Completion has been issued by Ohio EPA through the VAP. Therefore, all laboratory analyses will be conducted under VAP DQO protocol.

Pace, a VAP-certified laboratory, will be the primary laboratory for this project (Certificates located in **Appendix B**). As discussed in Section 1.1, a VAP-certified laboratory is one that has undergone performance evaluations performed by a VAP accredited authority, in this case the State of Ohio, for method accuracy and precision, and meets the requirements set forth by the U.S. EPA. Analyses of volatile organic compounds [VOCs], semivolatile organic compounds [SVOCs], inorganic metals analyses including mercury, total petroleum hydrocarbon [TPH] compounds – gasoline-range organics and diesel-range organics [GRO/DRO], polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs), and hexavalent chromium will be performed by Pace at their Indianapolis, Indiana laboratory. VAP-certified VOC analyses for air/vapor samples will be performed by Pace at their Minneapolis, Minnesota laboratory. Total organic carbon (TOC) analyses using the Walkley-Black procedure will be performed by Pace at their Green Bay, Wisconsin laboratory. Analyses of cyanide, herbicides, and pesticides will be performed by TestAmerica at their North Canton, Ohio laboratory. Analyses of asbestos in soil and groundwater, as well as lead-based paint will be performed by ALS Group (ALS) at their Cincinnati, Ohio laboratory. Bulk ACM samples will be analyzed by EMLab at their San Bruno California laboratory. Low-level mercury samples will be analyzed by Mercury One, Ltd. (Mercury One) at their Twinsburg, Ohio laboratory. Copies of the Pace, TestAmerica, and ALS VAP certificates, and NVLAP certificates for EMLab and Mercury One, are included in **Appendix B**. **Table 2** summarizes the analyses to be performed by each separate laboratory.

1.4.2 Project Quality Objectives

The project quality objectives process is a series of planning steps designed to ensure that the type, quantity, and quality of environmental data used in decision making are appropriate for the intended application. There are five steps in the project quality objectives process that include problem statement, decision identification, decision inputs, assessment boundary, and the decision process. The details of these steps are provided in the following sections.

1.4.2.1 Problem Statement

Cuyahoga County Department of Development intends to use the U.S. EPA Brownfields Assessment Grant funds to investigate properties listed for redevelopment, and possibly several others as identified by members of the community. Based on the prioritization, the balance of the funds will be used to conduct Phase I and Phase II ESAs. The intention of the Phase Is will be to identify environmental conditions that may cause threats to redevelopment. All Phase I assessments will comply with the AAI rule of November 2005, and that the ASTM E1527-05 is consistent and compliant with AAI. In addition, in cases where the OEPA VAP Phase I requirements need to be met, the Phase I can be performed to comply with both standards, and a statement to this effect can be included. The property-specific work plans will detail the proposed methods for identifying contaminants, assessing the hazards posed by these contaminants, and managing or remediating contaminants for property redevelopment.

Exposure assessments and proposed redevelopment use of each of the Property are discussed in the property-specific SAP.

1.4.2.2 **Decision Identification**

Available information will be used to determine if the Property has been impacted. To assess the feasibility of property redevelopment, the Cuyahoga County Department of Development will ask the following questions:

- Do contaminant levels exceed applicable standards such as VAP limits or BUSTR?
- Can the contaminants be managed by eliminating exposure pathways through engineering and institutional controls?
- Will the property require remediation prior to redevelopment?
- If remediation is too costly based on the expected land use, can the property be developed for another use?

1.4.2.3 **Decision Inputs**

Samples of soil, sediment, groundwater, soil gas, indoor air, and/or surface water will be collected for analysis as described in the SAPs in order to assess the level of contamination. Samples will be collected to either assess the data gaps identified from work previously completed or assess Recognized Environmental Conditions (RECs) noted during the Phase Is. An REC is the presence or likely presence of any hazardous substance and/or petroleum's or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substance and/or petroleum's or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property or nearby properties. Such data gaps or environmental conditions may answer the following:

- What is the level of potential exposure to surface or subsurface soils at the property?
- What is the level of potential exposure to surface water and associated sediments at the property?
- What is the level of potential exposure to groundwater at the property?
- Have past uses of the property (or adjacent properties) impacted the soil, sediment, surface water, or groundwater?
- Did past 'hazardous substance and/or petroleum' handling or storage activities, if any, impact the property?
- If any former underground storage tanks (USTs) existed on the property, does contamination exist near the area of the identified tank?
- Have former aboveground storage tanks (ASTs) impacted the surrounding media at the property?
- Does fill material (such as slag) used at the property contain contaminants that may impact soil, sediment, surface water, or groundwater?
- Have uncontrolled dumping or landfilling activities occurred at the property, and if so, have they impacted the soil, sediment, surface water, or groundwater?

1.4.2.4 **Assessment Boundary**

A site map showing the assessment boundary will be provided in the SAP. Because areas of concern will be selected based on the results of VAP Phase I ESAs and the nature of environmental impacts are not completely known, detailed information regarding the areas of concern cannot be determined currently. However, once the areas of concern are identified, information regarding the assessment boundaries will be included in the SAP. The assessment boundary information in the property-specific SAP will include the property boundary, potential exposure areas, and sample locations and depths.

The vertical assessment boundary will vary depending on the end use of the subject property. Under Ohio VAP, vertical points of compliance differ for residential and commercial/industrial uses.

1.4.2.5 **Cuyahoga County Decision Process**

Ohio EPA VAP generic numerical standards may be the applicable standards for cleanup criteria. Soils and sediment will be compared to the applicable Single Chemical Generic Direct Contact Soil (SCGDC) land use standards presented in Ohio Administrative Code (OAC) 3745-300-08. The VAP soil standards for residential properties and commercial/industrial properties are presented in Table 3a (located at the end of the QAPP). Groundwater results will be compared with the VAP Unrestricted Potable Use Standards (UPUS). These are also presented in Table 3a. If there is the potential for volatile COCs in soil or groundwater then a Conceptual Site Model (CSM) and DQOs will be required for evaluating the vapor intrusion pathway. The U.S. EPA Johnson & Ettinger Model (J&E Model) will be utilized to evaluate the potential for subusurface vapor intrusion into buildings since Ohio EPA does not have final vapor intrusion standards. Ohio EPA vapor intrusion standards will be used if finalized during project work. If sample results collected as part of the property assessment are all below the applicable VAP standards (OAC 3745-300-08) and the soil vapor data evaluation indicates risk/hazard goals are not exceeded, then the redevelopment project will proceed as planned.

If sample results exceed the applicable land-use specific VAP standards or the risk/hazard goals for subsurface vapor intrusion, the Cuyahoga County Department of Development will consider the following options:

- If contaminant levels exceed the VAP criteria, then the Cuyahoga County Department of Development may opt to resample the specific locations associated with elevated contaminant levels. If any of the resample results confirm the original data, the Cuyahoga County Department of Development will consider the second option listed below. If all the resample results are below the

VAP limits and site-specific subsurface vapor intrusion risk/hazard goals, no further remedial action will be pursued at the property.

- If soil or groundwater contaminant levels exceeding VAP standards are associated only with a specific exposure pathway, the Cuyahoga County Department of Development may then conduct a property-specific risk assessment and pursue an exclusion of exposure pathways through the use of engineering and institutional controls. These controls may be implemented through an Operation and Maintenance (O&M) Agreement with Ohio EPA.

- If an exposure pathway cannot be eliminated through engineering or institutional controls, then the Cuyahoga County Department of Development may develop a Remedial Action Plan to meet the needs of the proposed future use of the property.

- If subsurface vapor intrusion data evaluation indicates the possibility of an imminent hazard then the Cuyahoga County Department of Development will contact the Ohio EPA as soon as possible in accordance with the Ohio EPA *Sample Collection and Evaluation of Vapor Intrusion to Indoor Air for Remedial Response and Voluntary Action Programs Guidance Document* (May 2010).

1.5 Quality Assurance Objectives for Measurement

The overall QA objective for the project is to develop and implement procedures for field sampling, COC, laboratory analysis, and reporting using VAP protocol. Specific procedures for sampling, COC, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, audits, preventative maintenance of field equipment, and corrective action are described in other sections of this QAPP.

DQOs for measurements during this project will be addressed in terms of precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS). The numerical PARCCS parameters will be determined from the project DQOs to ensure that they are met. The DQOs and resulting PARCCS parameters will require that the sampling be performed using standard methods with properly operated and calibrated equipment, and conducted by trained personnel.

1.5.1 Precision

Precision is the degree of agreement among repeated measurements of the same parameter under the same or similar conditions. Precision is reported as either relative percent difference (RPD) or relative standard deviation (RSD), depending on the end use of the data.

1.5.1.1 Field Precision Objectives

Field precision will be assessed through the collection and analysis of field duplicate samples. RPDs will be calculated for the detected analytes from investigative and field duplicate samples. Water matrix samples can be readily duplicated due to their homogeneous nature; conversely, the duplication of soil samples is much more difficult due to their nonhomogeneous nature. Due to this difficulty, RPDs of ±35 percent and ±50 percent for water and soil sample field duplicates, respectively, will be used as advisory limits for analytes detected in both investigative and field duplicate samples at concentrations greater than or equal to five times its QL. A summary of duplicate samples to be collected is presented in **Table 4** (presented at the end of the QAPP), along with the other quality control samples. Per the Ohio VAP, field duplicate samples must be provided for each matrix (soil, groundwater, etc.) sampled. The minimum number of field duplicate samples required for each round of sampling is 1 for every 20 samples per matrix. If there are fewer than 20 samples per matrix, one field duplicate per matrix will be submitted.

Field sampling for ACM will follow Asbestos Hazard Emergency Response Act (AHERA) sampling protocols. Asbestos sampling procedures are documented in B&Ns Standard Operating Procedures (SOP) for bulk asbestos sampling included in **Appendix E** of this QAPP.

1.5.1.2 Laboratory Precision Objectives

For Pace, precision of laboratory analyses will be based upon laboratory matrix spike/matrix spike duplicate (MS/MSD) analyses. Precision is reported as RPD or RSD, and the equation to be used to determine precision is presented in Section 4.3.1. MS/MSD analyses will be either at a rate of 1 per 20 samples received by the laboratory or in accordance with laboratory SOPs. **Table 3b** lists the MSD and RPDs used by Pace.

For the EMLab, analyst and laboratory accuracy is assessed by re-analysis of known reference and proficiency test samples. Those samples containing any asbestos are subjected to a statistical analysis wherein the analyst and laboratory bias is assessed and the accuracy of the analysis is entered into control charts for the individual analyst and for the laboratory as a whole. A similar analysis is performed on the comparative data between visual estimates of asbestos content and point count determinations. EMLab's QA Manual (January 2011) is included in **Appendix C** of this QAPP.

1.5.2 Accuracy

Accuracy is the extent of agreement between an observed or measured value and the accepted reference, or true, value of the parameter being measured.

1.5.2.1 Field Accuracy Objectives

The objective for accuracy of the field sample collection procedures will be to ensure that samples are not affected by sources external to the sample, such as sample contamination by ambient conditions or inadequate equipment decontamination procedures. Sampling accuracy will be assessed by evaluating the results of equipment and trip blank samples for contamination.

Trip blanks will accompany sample containers and be subjected to the same handling procedures as the field samples, but will not be opened and will be shipped back to the laboratory with the samples. Trip blanks are required only when VOCs will be analyzed. Trip blanks will be submitted at the rate of one trip blank per shipping container containing field samples for laboratory VOC analysis (for water samples) and one trip blank per lot of bottles or per sampling event/site, whichever is more frequent, for soils (in cases where field preservation is used for soil VOCs, e.g. methanol and/or DI). A trip blank will consist of a laboratory-prepared sample of lab preserved reagent-grade water (when water samples are collected). A trip blank for soil VOCs will consist of one set of pre-preserved VOA vials. The trip blank samples will provide a measure of potential cross contamination of samples by VOCs during shipment and handling.

Equipment blanks will be collected by pouring laboratory-prepared water or distilled water over or through the field sampling equipment and collecting the rinsate in the proper analytical containers. Equipment blanks must be submitted to the laboratory with investigative samples and analyzed for the same parameters as the investigative samples. The minimum number is one per 20 field samples per matrix or, if less than 20 samples are collected, one equipment blank per day per sample matrix. If all disposable or single use sampling equipment is used, then a field blank will be collected in lieu of an equipment blank at a rate of one per sampling event or per lot of bottles, whichever is more frequent.

Trip, equipment and /or field blanks will be analyzed during assessment activities in order to assess potential problems as they occur.

1.5.2.2 **Laboratory Accuracy Objectives**

Laboratory accuracy will be assessed by determining percent recoveries from the analysis of laboratory control samples (LCSs) or standard reference materials (SRMs). The analyses of MS/MSD samples are also utilized to determine laboratory accuracy by determining percent recoveries from the analysis of MS/MSD samples. MS/MSD samples will be collected for organic and inorganic analyses at a minimum frequency of 1 per 20 or fewer samples. The equation used to determine accuracy for this project is presented in Section 4.3.2.3.

The accuracy of the organics analyses also will be monitored through analysis of surrogate compounds. Surrogate compounds are added to each sample, standard, blank, and quality control (QC) sample prior to sample preparation and analysis. Surrogate compounds are not expected to be found occurring naturally in the samples, but behave analytically similar to the compounds of interest. Consequently, surrogate compound percent recoveries will provide information on the effect that the sample matrix exhibits on the accuracy of the analyses.

In addition, please see Section 5.0 of the Pace QA Manual, located in **Appendix C** of this QAPP, for the laboratory's QA objectives.

Specific details of EMLab QA methodologies are included in their Quality Manual (January 2011) located in **Appendix C** of this QAPP.

1.5.3 Representativeness

Representativeness is a qualitative term that describes the extent to which a sampling design adequately reflects the environmental conditions of the property. It also reflects the ability of the sample team to collect samples and laboratory personnel to analyze those samples in such manners that the data generated accurately and precisely reflect the conditions at the site.

1.5.3.1 Measures to Ensure Representativeness of Field Data

Representativeness will be achieved by establishing the level of allowable uncertainty in the data and then statistically determining the number of samples needed to characterize the population through the DQO process. It will also be achieved by ensuring that sampling locations are properly selected. Representativeness is dependent upon the proper design of the sampling program and will be accomplished by ensuring that this QAPP, the property-specific SAP, and standard procedures are followed. The QA goal will be to have all samples and measurements representative of the media sampled. Field testing for pH, temperature, and specific conductivity stabilization prior to groundwater sampling will ensure that representative samples are collected. Soil intervals will be homogenized for all analyses except VOCs to help ensure that representative soil samples are collected. Suspected ACM and lead based paint samples will be collected to ensure enough material is collected to accurately represent the bulk sample.

1.5.3.2 Measures to Ensure Representativeness of Laboratory Data

Representativeness of laboratory data cannot be quantified. However, adherence to the prescribed analytical methods and procedures, including holding times, blanks, and duplicates, will ensure that the laboratory data is representative.

1.5.4 Completeness

Completeness is defined as the measure of the quantity of valid data obtained from a measurement system compared to the quantity that was expected under normal conditions. While a completeness goal of 100 percent is desirable, an overall completeness goal of 90 percent may be realistically achieved under normal field sampling and laboratory analysis conditions.

1.5.4.1 Field Completeness Objectives

The field-sampling team will take measures to have data generated in the field be valid data. However, some samples may be lost or broken during handling and transit. Therefore, field completeness goals for this project will be to have 90 percent of all samples be valid data. The equation for calculating completeness is presented in Section 4.3.5.1.

1.5.4.2 Laboratory Completeness Objectives

Laboratory completeness will be a measure of the quantity of valid data measurements and analyses obtained from all the measurements and analyses completed for the project. The laboratory completeness goal is for 90 percent of the samples analyzed to be valid data. The procedure for determining laboratory data validity is provided in Section 4.2.2. The equation for calculating completeness is presented in Section 4.3.5.1.

1.5.5 Comparability

The confidence with which one data set can be compared to another is a measure of comparability. The ability to compare data sets is particularly critical when a set of data for a specific parameter is compared to historical data for determining trends.

1.5.5.1 Measures to Ensure Comparability of Field Data

Ensuring that this QAPP and the property-specific SAP are adhered to and that all samples are properly handled and analyzed will satisfy the comparability of field data. Additionally, efforts will be made to have sampling completed in a consistent manner by the same sampling team.

1.5.5.2 Measures to Ensure Comparability of Laboratory Data

Analytical data are comparable when the data are collected and preserved in the same manner followed by analysis with the same standard method and reporting limits. Data comparability is limited to data from the same environmental media. Analytical method quality specifications have been established to help ensure that the data will produce comparable results. **Table 3a** summarizes the laboratory reporting limits.

1.5.6 Sensitivity

Sensitivity is the ability of a method or instrument to detect a parameter to be measured at a level of interest.

1.5.6.1 Measures to Ensure Field Sensitivity

The sensitivity of the field instruments selected to measure temperature, conductivity, turbidity, and the dissolved oxygen (DO) of groundwater for this project will be measured by analyzing calibration check solutions, where appropriate, that equate to the lower end of the expected concentration range. The sensitivity of the PID used to screen samples for organic vapor is relative to background readings in ambient air. The sensitivity of the GEM-2000 will be measured by analyzing calibration check gases per manufacturer's specifications.

1.5.6.2 Measures to Ensure Laboratory Sensitivity

The sensitivity requirements for laboratory analyses are to be such to an extent as to meet VAP standards for both soil and groundwater, Ohio EPA ACM standard of 1% and the U.S. Department of Housing and Urban Development (HUD) standard for lead-based paint of 0.5 percent by weight. If analytical methods are deemed to be insufficiently sensitive, alternative analytical methods may be utilized. Additionally, minimum laboratory detection limits which exceed VAP standards will be evaluated in the following manner:

- Is the compound expected to be a chemical of concern, or, if the reporting limit exceeds VAP groundwater standards, was the compound detected in the surrounding soils? If the compound is not an expected chemical of concern or detected in the soils, then the compound will be considered nondetect. If the compound is considered a chemical of concern (COC) or was detected in the surrounding soils, the compound will be evaluated in a human health risk assessment (HHRA) using half the detection limit.

- If the reported detection limit exceeds VAP groundwater standards, does the compound have an established Federal maximum contaminant level (MCL), and if so, does the reporting limit meet the MCL. If the reporting limit meets the MCL, the compound will be considered nondetect. If the reporting limit exceeds the MCL, the compound will be evaluated as part of a HHRA using half the reported laboratory detection limit.

Table 3a presents the laboratory reporting limits.

1.6 Documentation and Records

Records generated during Phase II Property Assessment activities are a critical part of any property assessment. B&N will use select documents for recording information during project activities. Records to be used for project documentation include field forms, field books, laboratory data sheets, COC forms, and technical papers. B&N will retain the records generated during assessment activities for a minimum of 10 years following the completion of this project. At that time, Cuyahoga County will be contacted prior to disposal of these records.

At a minimum, the draft and final Phase II ESA report submittal packages will include the following:

- Text describing field-sampling methodologies, analytical results, conclusions, and recommendations.
- Figures showing property location, property boundaries, sampling locations and summaries of impacted areas.
- Tables comparing all laboratory data to the applicable standards.
- Tables summarizing QA/QC analytical results.

- Complete laboratory data reports, including copies of all COC records.
- Copies of soil boring and groundwater sampling logs.
- Other relevant material needed to support property redevelopment.
- DAR (per section 4 of this QAPP) that discusses and compares overall precision and accuracy data from each matrix, analytical parameter, and concentration level.

2.0 DATA GENERATION AND ACQUISITION

The purpose of the QAPP is to produce reliable data that will be generated throughout the assessment by:

- Ensuring the validity and integrity of the data;
- Ensuring and providing mechanisms for ongoing control of data quality;
- Evaluating data quality in terms of PARCCS; and
- Providing usable, quantitative data for analysis, interpretation, and decision making.

2.1 Sampling Process Design

Sample locations, analytical parameters, and frequency of sampling will be discussed in the site-specific SAPs. Laboratory test parameters for the sampling program will include analysis for one or more of the following parameters listed in **Table 2**.

The laboratory SOPs for these analytical parameters are presented in **Appendix C**.

Analytical parameters will be chosen based on representative contaminants most commonly associated with the former activities and/or identified areas (IAs) at each property.

Sampling will occur as a stepwise process. During initial sampling activities, it is expected that a variety of chemicals of concern will be analyzed. The initial results may indicate that only certain chemicals of concern are present. Therefore, later rounds of sampling will include only those specific compounds or class of compounds present in the initial sampling events.

QA/QC samples will be submitted in accordance with the QAPP protocols presented in the following sections. Requirements for QA/QC samples are presented in **Table 4**.

2.2 Analytical Methods Requirements

In order to preserve the integrity of samples both before and during analyses, specific analytical methods and requirements for those methods will be followed. Samples will be collected, prepared, and analyzed in accordance with the analytical methods outlined in Pace SOPs (**Appendix C**). Pace will coordinate all analytical services for this assessment. The specific analytical method and reporting limits for each parameter are presented in **Table 3a**. Preparatory methods for analytical parameters are discussed in the laboratory SOPs included in **Appendix C**.

Proper sample containers, preservation, holding times, and volumes for each analytical parameter are outlined in **Table 5** (presented at the end of the QAPP). Pace will provide all sample containers and preservatives for this project. Sample containers for groundwater VOC analysis will be pre-preserved with acid by the laboratory. Metals will be pre-preserved by Pace and/or preserved in the field using pre-measured acid vials, and pH paper will be used to verify that pH is <2 for the preserved samples. In addition, sample containers for groundwater cyanide analysis will be pre-preserved with NaOH, and pH paper will be used to verify that pH is >12 for the preserved samples.

Soils for VOC or GRO analysis may be collected either in Encore® sampling tubes or in TerraCore® sampling kits. The Encore sampling tubes collect 5 grams of soil and are never field preserved. However, they are to be preserved within 48 hours of collection by the laboratory. A minimum of 3 Encore® sampling tubes are needed for VOC or GRO analysis along with filling one 2 oz or 4 oz jar for moisture content. TerraCore® sampling kits, however, do require field preservation. For VOC or GRO analysis this will include collecting three, approximately 5 grams each, soil samples that are extruded into the pre-preserved vials. Two of the soil samples will be placed into a 40 milliliter (ml) volatile organic analysis (VOA) vial preserved with laboratory-grade deionized (DI) water, the other 5 gram sample will be extruded into the VOA vial preserved with 5 ml methanol. In addition, a 2 oz or 4 oz jar of representative soil will be required to be collected for percent moisture content. If a soil sample is to be analyzed for both VOCs and GRO, either an additional Encore® tube or two additional DI water preserved TerraCore® kit VOA vials will need to be collected depending which sampling technique is performed. Sampling methodologies for either the Encore® sampler or the TerraCore® kit VOA vials are contained within B&N SOPs in **Appendix E**. In addition, **Table 5** summarizes the container type, preservation (if needed), and laboratory hold time for each type of analysis per sample matrix.

All sample containers supplied by Pace will be cleaned according to U.S. EPA standards. QC documentation will be supplied with the sample containers and preservatives in order to verify their purity. The containers and preservatives can be traced back to their certificate of analysis from their lot number. The QC documentation/certificate of analysis shall be maintained on file with Pace. Additionally, Pace shall provide the field team with trip blanks for VOC analysis and laboratory-grade DI water for rinsing field equipment and instruments.

2.3 Sample Handling and Custody Requirements

Proper sample handling and custody procedures are crucial to ensuring the quality and validity of data obtained through field and laboratory analyses. For example, the admissibility of environmental data as evidence in a court of law is dependent on the custody of the data. Custody procedure will be used to document the authenticity of data collected during the Cuyahoga County Brownfield Assessment Project. The data requiring custody procedures include field samples and data files that can include field books, logs, and laboratory reports. An item is considered in custody if it is:

- In a person's possession;
- In view of the person after being in their possession;
- Sealed in a manner that it cannot be tampered with after having been in physical possession; or
- In a secure area restricted to authorized personnel.

2.3.1 Sample Collection Documentation

Sample-handling procedures include field documentation, COC documentation, sample shipment, and laboratory sample tracking. Various aspects of sample handling and shipment, as well as the proposed sample identification system and documentation, are discussed in the following sections.

2.3.1.1 **Field Books**

Detailed records of the field activities will be maintained in project notebooks and field books dedicated to each site addressed under the US EPA Brownfield Assessment Grant. Entries will be dated and signed by personnel recording the data. Each field book will have a unique numerical identifier permanently attached, and each page will be numbered, permitting indexing of key data. At a minimum, information recorded in the project notebook and/or field books will include documentation of sample locations, sampling times, types of samples collected, weather conditions, and any other information pertinent to the assessment.

2.3.1.2 **Field Identification System**

Each sample collected during property assessments will be given a unique identification code. Each unique sample identification will consist of the following:

- *Project Identification Code.* A two-letter designation will be used to identify the property from which the sample was collected. Examples of this include the following:

  SG – Smitty's Gas Station
  BF – Bulk facility

- *Sample Matrix Code.* Each sample will be further identified on the chain of custody by a code corresponding to the sample matrix:

  GW – groundwater sample
  SW – surface water sample
  SD – sediment sample
  SS – surface soil sample
  SB – subsurface soil sample
  TB – trip blank sample
  EB –equipment blank sample

FD – field duplicate sample.

- *Location Code.* Lastly, each sample will be identified by a location code and interval as follows (note that surface water, sediment, and surface soil samples will be numbered consecutively and not given an additional location identifier):

  MW-## - monitoring well location
  SP-## - location of soil probe or other direct-push boring
  SB-## - location of borings completed by methods other than direct-push
  HA-## - hand auger sample location.

- *Examples.*

  SG-GW-MW-01 = groundwater sample from Monitoring Well 1 Smitty's Gas Station property

  SG-GW-MW-01-FD = duplicate groundwater from MW 1

Sample bottle labels appropriate for the size and type of containers shall be provided by Pace. The sample containers will be labeled at the time of sample collection but prior to being filled. Each label will indicate at a minimum:

- Sample identification
- Date/time of sample collection
- Sampler's initials
- Required analyses
- Type of preservative.

All labels will be completed in waterproof ink. An example of a sample label is included in **Appendix D**.

2.3.1.3 Field Sample Handling

The possession and handling of samples will be documented from the time of collection to delivery to the laboratory. B&N field personnel are responsible for ensuring that COC procedures are followed. Field personnel will maintain custody of all samples until they are relinquished to another custodian, the laboratory, or to the freight shipper.

All samples must be catalogued on a COC form using sample identification codes. A copy of the COC form is included in **Appendix D**. The date and time of collection will be recorded on the form, as well as the number of each type of sample, the method of preservation, and the type of analysis. The COC SOP is located in **Appendix E**.

2.3.1.4 Field Sample Packaging and Shipping

Samples will be packaged and transported in a manner that maintains the integrity of the sample and permits the analysis to be performed within the prescribed holding time. Prior to shipment, each sample container will be inspected for a label with the proper sample identification code.

Samples will be either couriered or shipped via overnight mail to the laboratory. The laboratory will be contacted in advance to expect shipment so that holding times of the samples will be conserved. The COC forms will be sealed in a plastic bag and transported inside the sample cooler. In addition, any shipping receipts will be incorporated into the COC documentation. Samples will be packed in the cooler using bubble-wrap packing materials and ice. Any samples suspected of being highly contaminated will additionally be sealed in a Ziploc®-type bag. The cooler will be taped closed using custody seals provided by the laboratory to prevent tampering during transport. Upon relinquishing the sample cooler to the laboratory, B&N field personnel will sign custody of the samples over to the laboratory by signing and dating the bottom of the COC form. One copy of the COC documentation will be retained by the B&N data manager and a second copy will be retained by the laboratory. The integrity of the custody seals shall be noted by the laboratory on the COC form upon arrival. In addition, the shipping label will be included with the COC form retained by the B&N data manager.

2.3.1.5 Field Documentation

Field COC procedures will ensure the proper documentation of each sample from collection in the field to delivery at the laboratory. Custody of samples shall be maintained and documented at all times. The documentation for each sample will include the following information:

- COC form
- Sample label with sample identification code
- Shipping documents.

This documentation will allow for proper identification and verification of all samples upon arrival at Pace.

2.3.2 Laboratory Chain of Custody

The laboratory will perform laboratory custody procedures for sample receiving and log-in, sample storage, tracking during sample preparation and analysis, and storage of data in accordance with their SOPs. The Pace project manager will be responsible for ensuring that laboratory custody protocol is maintained. The laboratory's SOP for sample custody is presented in the Laboratory QA Manual (**Appendix C**).

2.3.3 Final Evidence Files Custody Procedure

B&N will be responsible for the custody of the evidence files and maintain and update the contents of the files during the project. The evidence files will include all records relevant to sampling and analysis activities such as boring logs, field books, photographs, subcontractor reports, laboratory data deliverables, COC forms, and data reviews. B&N will retain this file for a period of 10 years after completion of the assessment.

2.4 Quality Control Requirements

The QC requirements ensure that the environmental data collected is of the highest standard feasible as appropriate for the intended application. Facets of the QC requirements are provided in the following sections.

2.4.1 Field Quality Control Requirements

Where applicable, QC checks will be strictly followed during the assessment through the use of replicate measurements, equipment calibration checks, and data verification by B&N field personnel. Field-sampling precision and data quality will be evaluated through the use of sample duplicates, equipment blanks, and trip blanks. Sample duplicates provide precision information regarding homogeneity, handling, transportation, storage, and analysis. Equipment blanks will be used to ensure that proper decontamination procedures have been performed and that no cross contamination has occurred during sampling or transportation. Trip blanks will be used with VOCs only, to ensure that transportation of samples has not contaminated the samples. If there is any discrepancy in the sample data, the B&N project manager will be notified and, if deemed necessary, resampling of the questionable point scheduled. Requirements for field QA/QC samples are listed in **Table 4**. QA/QC sample quantities are also identified in the property-specific SAP.

2.4.2 Laboratory QC Requirements

The laboratory QA manager will be responsible for ensuring that the laboratory's data precision and accuracy are maintained in accordance with specifications. Internal laboratory QA/QC is performed according to laboratory SOPs. Soil and water samples that are submitted for laboratory MS/MSD or spike and duplicate analyses will have an additional set of samples collected from the sample locations. In the case of VOCs, triple the amount will be collected. Typically laboratories require two to three sample containers for each sample location, therefore, six to nine sample containers will be collected for laboratory MS/MSD analyses (i.e., nine TerraCore® or EnCore® sample tubes will be collected). If soil VOCs are preserved in the field with methanol, additional sample volume is not required for the MS/MSD analyses. For water analyses of SVOCs, pesticides, herbicides, and/or PCBs the laboratory requirements will be confirmed and noted here since these analyses typically require at a minimum double and up to triple the amount of water for the MS/MSD analyses.

2.5 Instrument Calibration and Frequency

The calibration procedures to be employed for both the field and laboratory instruments used during the Cuyahoga County Brownfield Assessment Project are referenced in this section. Measuring and test equipment used in the field and laboratory will be subjected to a formal calibration program. The program will require equipment of the proper type, range, accuracy, and precision to provide data compatible with the specified requirements and the desired results. Calibration of measuring and test equipment may be performed internally using in-house reference standards, or externally by agencies or manufacturers.

The responsibility for the calibration of laboratory equipment rests with Pace. B&N field personnel are responsible for the calibration of B&N field equipment and field equipment provided by subcontractors.

Documented and approved procedures will be used for calibrating measuring and testing equipment. Widely accepted procedures, such as those published by U.S. EPA and American Society for Testing and Materials (ASTM), or procedures provided by manufacturers in equipment manuals will be adopted.

Calibrated equipment will be uniquely identified by the manufacturer's serial number, a B&N equipment identification number, or by other means. This identification, along with a label indicating when the next calibration is due (only for equipment not requiring daily calibration), will be attached to the equipment. If this is not possible, records traceable to the equipment will be readily available for reference. It will be the responsibility of all equipment operators to check the calibration status from the due date labels or records prior to using the equipment.

Measuring and testing equipment will be calibrated at prescribed intervals and/or as part of operational use. Frequency will be based on the type of equipment, inherent stability, manufacturer's recommendations, values given in national standards, intended use, and experience. Equipment will be calibrated whenever possible using reference standards having known relationships to nationally recognized standards or accepted values of physical constants. If national standards do not exist, the basis for calibration will be documented.

Physical and chemical reference standards will be used only for calibration. Equipment that fails calibration or becomes inoperable during use will be removed from service, segregated to prevent inadvertent use, and tagged to indicate the fault. Such equipment will be recalibrated and repaired to the satisfaction of the laboratory personnel or B&N field personnel, as applicable. Equipment that cannot be repaired will be replaced.

Records will be prepared and maintained for each piece of calibrated measuring and test equipment to document that established calibration procedures have been followed. Records for subcontractor field equipment and B&N equipment used only for this specific project will be kept in the project files. Pace will maintain laboratory calibration records.

2.5.1 Field Instrument Calibration

Instruments used to gather, generate, or measure field environmental data will be calibrated with sufficient frequency and in such manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. Field measurement instruments will include PID units used to detect VOC vapors, the GEM-2000 to detect methane and explosive gases, pH meters, conductivity meters, and temperature probes. As applicable, field instruments will be calibrated daily prior to use. The calibration will be consistent with the standard procedure. The field calibration procedures are presented in the Field SOPs located in **Appendix E**.

Calibration procedures will be documented in the field logbook and/or field sampling sheets. Documentation will include the following:

- Date and time of calibration
- Identity of the person performing the calibration
- Reference standard used, if applicable
- Reading taken and adjustments to attain proper reading
- Any corrective action.

Trained personnel will operate field measurement equipment in accordance with the appropriate standard procedures or manufacturer's specifications. B&N field technical staff members will examine field measurement equipment used during field sampling to verify that they are in operating condition. The B&N field team leader will periodically audit the calibration and field performance of the field equipment to ensure that the system of field calibration meets the manufacturer's specifications.

2.5.2 Laboratory Instrument Calibration

The proper calibration of laboratory equipment is a key element in the quality of the analysis done by the laboratory. Each type of instrumentation and each U.S. EPA-approved method have specific requirements for the calibration procedures, depending on the analytes of interest and the sample medium.

The calibration procedures and frequencies of the equipment used to perform the analyses will be in accordance with requirements established by the U.S. EPA. The laboratory QA manager will be responsible for ensuring that the laboratory instrumentation is maintained in accordance with specifications. Individual laboratory SOPs will be followed for corrective actions and preventative maintenance frequencies. Laboratory QC, calibration procedures, corrective action procedures, and instrument preventative maintenance are discussed in the Pace QA Manual (**Appendix C**).

2.6 Data Management

B&N field technical staff members will manage raw data during field activities. Data such as geologic profiles, pH readings, and pump test results will be recorded on the appropriate field forms (examples of which are located in **Appendix D**) or in field logbooks. The B&N data manager will periodically collect data gathered during assessment activities in order to maintain results. As appropriate, the B&N data manager will coordinate transfer of raw data to computer formats such as Microsoft® Excel or Microsoft® Access to better organize and track incoming data. This will enable the B&N data manager to identify any data gaps. Any flaws in field QA/QC will be brought to the attention of the B&N QA manager.

The Pace project manager will be responsible for laboratory data management. Pace procedures for data review and data reporting are discussed in Section 12.0 of Paces QA Manual, located in Appendix C. Analytical data reports generated by Pace will present all sample results, including all QA/QC samples. The data reports will include a laboratory narrative for the data set describing any out of control analyses and their effect on sample results, explanation of all lab applied qualifiers; all sample results including the % moisture content for soil samples, the spike and duplicate analysis results (or MS/MDS results) including the % recoveries and RPDs. The following data must be available upon request from the lab on a case by case basis, if data issues arise: summaries of daily calibration check samples (including notation of any outliers), calibration blank results, surrogate results including % recoveries (as applicable per analysis), the method blank results, and lab control sample (LCS) results including % recoveries. Soil results will be reported on a dry weight basis. All data, including QA/QC results, will become part of the project files and will be maintained by the B&N data manager. Upon report delivery, B&N personnel will analyze laboratory data in accordance with accepted statistical methodologies and will be supervised by the B&N data manager.

3.0 ASSESSMENT/OVERSIGHT

Performance and system audits will be completed to ensure that the field sampling activities and laboratory analyses are performed following the procedures established in this QAPP, including the attached SOPs, and the property-specific SAPs. The audits may be both internally and externally led, as further described below.

3.1 Technical Systems Audits

Generally, system audits are a qualitative measure of adherence to sampling QA measures overall, including sample collection handling, decontamination procedures, COC, and recording requirements in the field, as well as sample receiving, log-in, and instrument operating records in the laboratory.

3.1.1 Field Data

A B&N geologist will be present at the site during sampling activities. The geologist will provide the on-site supervision required during the project. The geologist will be in daily contact with the B&N field team leader, who will then review compliance with the project objectives and sampling protocol outlined in this QAPP. Any anticipated modifications to the sampling or measuring procedures will be reported to the Project Manager and U.S. EPA project manager. B&N field technical staff members will report modifications to the B&N project manager, and document the modification in the field logbook.

Sample data precision will be determined by the collection and subsequent analysis of sample duplicates, equipment blanks, and trip blanks to verify reproducibility.

3.1.2 Field Screening Instruments

B&N field technical staff members will audit and maintain the performance field-screening instruments. Instruments will be calibrated according to the standard procedures located in **Appendix E**, and regular preventative maintenance will be performed as described in **Table 6** (located at the end of the QAPP).

3.1.3 Report Preparation

Prior to submittal to the Cuyahoga County Department of Development and U.S. EPA, all reports will undergo a peer review conducted by a project team within B&N. All components of the report will be checked and initialed by a designated team member. Cuyahoga County Department of Development will also review all reports prior to submittal to U.S. EPA.

3.1.4 Laboratory Data

Laboratory results will be reviewed for compliance against the DQO criteria for the level of reporting required.

3.2 Performance Evaluation Audits

Generally, performance audits are a quantitative measure of field sample collection and laboratory analyses quality.

3.2.1 Field Audits

The B&N QA manager will conduct audits of field activities. U.S. EPA may also conduct an independent field audit. At least one field audit will be completed near the beginning of the sample collection activities for each assessment. If a second phase of field activities is necessary and the second phase starts more than 6 months following the initial phase, then a second field audit will be completed. The field audit will include the following checklist:

Item	Description of Field Audit Activities	QA Manager Initials
1.	Review of field-sampling records	
2.	Review of field-measurement procedures	
3.	Examination of the application of sample identifications following the specified protocol	
4.	Review of field instrument calibration records and procedures	
5.	Recalibration of field instruments to verify calibration to the manufacturer's specifications	
6.	Review of the sample handling and packaging procedures	
7.	Review of COC procedures	

If deficiencies are observed during the audit, the deficiency shall be noted in writing and a follow-up audit may be completed if deemed necessary by the project QA manager. Corrective action procedures may need to be implemented due to the findings from the audit. Such actions will be documented in the field logbook and/or project notebook.

3.2.2 Laboratory Audits

Pace will perform many, if not all, of the analytical services required during the assessments. As discussed in Section 1.4.1.2, Pace is a VAP-certified laboratory (Number CL0065), and a copy of their VAP-certificate is located in **Appendix B**. In addition, if any asbestos sampling is performed, analysis will be performed by EMLab, a NVLAP-certified laboratory. A copy of their NVLAP-certificate is also contained in **Appendix B**. As the primary contracted laboratory, Pace will be responsible for all analytical work for this project using SW-846 methods. The Pace QA manager will be responsible for ensuring that the laboratory data precision and accuracy are maintained in accordance with specifications and laboratory SOPs. As a VAP-certified lab, Pace is routinely audited by the State of Ohio.

3.3 Reports to Management

For the duration of the project, quarterly reports will be prepared by the B&N project manager and submitted to the Cuyahoga County Department of Development and U.S. EPA project manager. These reports will serve to inform the Cuyahoga County Department of Development and U.S. EPA of the project progress and any significant interim findings that have been identified. This will streamline the process of addressing issues as they arise and adjusting the program to better define the environmental concerns. At the completion of the assessment, draft and final project reports will be issued.

4.0 DATA VALIDATION/USABILITY

This section describes the QA activities that will be performed to ensure that the collected data are scientifically defensible, properly documented, and of known quality, and meet project objectives. All analytical data collected for the Cuyahoga County Department of Development Brownfield Assessment Project will be validated.

The following three steps will be followed to ensure that project data quality needs are met.

1. **Data Verification** – Data verification is a process of evaluating the completeness, correctness, and contractual compliance of a data set against the method standard, SOP, or contract requirements. Data verification will be performed internally by the analytical group or laboratory generating the data. Additionally, data may be checked by an entity external to the analytical group or fixed laboratory. Data verification may result in accepted, qualified, or rejected data.

2. **Data Validation** – Data validation is an analyte- and sample-specific process that extends the qualification of data beyond method, procedural, or contractual compliance (i.e., data verification) to determine the analytical quality of specific data sets. Data validation criteria are based on the measurement performance criteria of the project QAPP. The group that generates the data will perform data validation. Data validation results are accepted, qualified, or rejected data.

3. **Data Usability Assessment** – Data usability assessment is the process of evaluating validated data to determine if the data can be used for purpose of the project (i.e., to answer the environmental questions or to make environmental decisions). Data usability will include the following sequence of evaluation:

    - First, individual data sets will be evaluated to identify the measurement performance/usability issues or problems affecting the ultimate achievement of project DQOs.

- Second, an overall evaluation of all data generated for the project will be performed.

- Finally, the project-specific measurement performance criteria and data validation criteria will be evaluated to determine if they were appropriate for meeting project DQOs.

In order to perform the data evaluation steps above, the reported data will be supported by complete data packages which include sample receipt and tracking information, COC records, tabulated data summary forms, and raw analytical data for all field samples, standards, QC checks and QC samples, and all other project-specific documents that are generated.

4.1 Instructions for Data Review, Validation, and Verification Requirements

This section describes the process for documenting the degree to which the collected data meet the project objectives, individually and collectively. B&N will estimate the potential effect that each deviation from this QAPP may have on the usability of associated data items, its contribution to the quality of reduced and analyzed data, and its effects on the decision.

The following procedures will be implemented to verify and validate data collected during the project:

- *Sampling Design* – How closely a measurement represents the actual environment at a given time and location is a complex issue. Each sample will be checked for compliance with the specifications, including type and location. B&N will note deviations from the specifications, and discuss them with the U.S. EPA project manager.

- *Sample Collection Procedures* – Sample collection procedures identified in this QAPP will be followed. If field conditions require deviations, they will be discussed with the U.S. EPA project manager.

- *Sample Handling* – Deviations from the planned sample handling procedures will be noted on the COC forms and in the field logbooks. Data collection activities will indicate the events that occur during sample handling affecting the integrity of the samples.

  B&N field technical staff members will evaluate the sample containers and the preservation methods used and ensure that they are appropriate to the nature of the sample and the type of data generated from the sample. Checks on the identity of the sample will be made to ensure that the sample continues to be representative of its native environment as it moves through the analytical process.

- *Analytical Procedures* – Each sample will be verified to ensure that the procedures used to generate the data were implemented as specified. Data validation activities will be used to determine how seriously a sample deviated beyond the acceptance limit so that the potential effects of the deviation can be evaluated.

- *Quality Control* – QC checks that are to be performed during sample collection, handling, and analysis are specified in an earlier section of this QAPP. For each specified QC check, the procedures, acceptance criteria, and corrective action should be specified. During data validation, the corrective actions that were taken, which samples were affected, and the potential effect of the actions on the validity of the data will be documented.

- *Calibration* – Field and laboratory instrument calibrations will be documented to ensure that calibrations:

  - Were performed within an acceptance time prior to generation of measurement data;
  - Were performed in proper sequence;
  - Included the proper number of calibration points;

- Were performed using a standard that bracketed the range of reported measurement results; and
- Had acceptable linearity checks and other checks to ensure that the measurement system was stable when calibration was performed.

When calibration problems are identified, any data produced between the suspect calibration event and any subsequent recalibration will be flagged to alert data users.

- *Data Reduction and Processing* – Checks on data integrity will be performed to evaluate the accuracy of raw data and include the comparison of important events and duplicate rekeying of data to identify data entry errors. Pace's QA Manual (**Appendix C**) discusses their data reduction procedures.

4.2 Instructions for Validation and Verification Methods

This section describes the process that will be followed to verify and validate the project data.

4.2.1 Verification

Field data will be verified by the B&N QA manager by reviewing field documentation and COC records. Data from direct-reading instruments used to measure conductivity, DO, and turbidity will be internally verified by reviewing calibration and operating records. The laboratory data will be verified in respect to the COC, units of measure, and citation of analytical methods. Data verification procedures followed by Pace are discussed in their QA Manual (**Appendix C**), and will include reviewing and documenting sample receipt, sample preparation, sample analysis (including internal QC checks), data reduction, and reporting. Any deviations from the acceptance criteria corrective actions taken, and data determined to be of limited usability (i.e., laboratory-qualified data) will be noted in the case narrative of the laboratory report. The QA manager will also verify the use of blanks and duplicates. All applicable reference and identification codes and numbers will be reviewed as part of the documentation.

4.2.2 Validation

Data validation will be conducted by B&N consistent with the procedure identified in Section 1.5 of this QAPP. The data verification/validation procedure will identify data as being acceptable, of limited usability qualified or estimated, or rejected. The conditions that result in data being qualified or estimated or rejected are identified in Section 1.5 of this QAPP. The results of the data verification/validation will be provided in data validation memoranda that are provided to B&N's project manager and are included in the Quality Assurance Management Reports. All sampling, handling, field analytical data, and fixed-laboratory data will be validated by entities external to the data generator. The validation procedure will specify the verification process of every QC measure used in the field and laboratory. Data validation procedures followed by Pace are discussed in their QA Manual (**Appendix C**).

Each analytical report will be reviewed for compliance with the applicable method and for the quality of the data reported.

Data determined to be unusable may require that corrective action be taken. Potential types of corrective action may include resampling by the field team or reanalysis of the samples by the laboratory. The corrective actions taken are dependent upon the ability to mobilize the field team and whether the data are critical for the project DQOs to be achieved. Should B&N's QA Officer identify a situation requiring corrective action during data verification/validation, B&N's project manager will be responsible for approving the implementation of the corrective action.

4.3 Instructions for Reconciliation with Data Quality Objectives

This section describes the scientific and statistical procedures/methods that will be used to determine whether data are of the right type, quality, and quantity to support environmental decision making for the project.

The Data Quality Assessment (DQA) process is described in *Guidance for the Data Quality Assessment Process: Practical Methods for Data Analysis*, EPA QA/G-9, July 1996.

EPA QA/G-9 will be used to guide the data assessment on this project. The DQA process will consist of five steps:

1. Review DQOs and sampling design
2. Conduct preliminary data review
3. Select statistical test
4. Verify assumptions
5. Draw conclusions from the data.

While the formal DQA process presented in the guidance may not be followed in its entirety, a systematic assessment of the data quality will be performed. This process will include a preliminary data review. Data will be presented in tables and figures to identify the trends, relationships, and anomalies.

The overall usability of the data for the project will be assessed by evaluating the PARCCS of the data set to the measurement performance criteria in Section 1.5 of this QAPP using statistical quantities as applicable. The procedures and statistical formulas to be used for these evaluations are presented in the following sections.

4.3.1 **Precision**

In order to meet the needs of the project, data must meet the measurement performance criteria for precision. Project precision will be evaluated by assessing the RPD data from the field duplicate samples. Analytical precision will be evaluated by assessing the RPD data from either duplicate spiked sample analyses or duplicate sample analyses. The RPD between two measurements is calculated using the following simplified formula:

$$\mathbf{RPD} = \frac{|R_1 - R_2|}{(R_1 + R_2)/2} \text{X } 100$$

where: R_1 = value of first result

R_2 = value of second result.

Overall precision for the sampling programs will be determined by calculating the mean RPD for all field duplicates in a given sampling program. This will provide an evaluation of the overall variability attributable to the sampling procedure, sample matrix, and laboratory procedures in each sampling program.

The overall precision requirement will be the same as the project precision. It should be noted that the RPD of two measurements can be very high when the data approach the QL of an analysis. The calculation of the mean RPD will include only the RPD values for field duplicate sample analyte data that are greater than or equal to five times the QL for an analysis.

Poor overall precision may be the result of one or more of the following:

- Field instrument variation
- Analytical measurement variation
- Poor sampling technique
- Sample transport problems
- Heterogeneous matrices.

In order to identify the cause of the imprecision, the field-sampling design rationale and sampling techniques should be evaluated by the reviewer, and both field and analytical duplicate/replicate sample results should be reviewed. If poor precision is indicated in both the field and analytical duplicates/replicates, then the laboratory may be the source of error. If poor precision is limited to the field duplicate/replicate results, then the sampling technique, field instrument variation, sample transport, or heterogeneous sample matrices may be the source of error.

If the Data Validation Report (DVR) indicates that analytical imprecision exists for a particular data set, then the impact of that imprecision on data usability must be discussed in the DAR. It should be noted that the DVR is considered to be the QA/QC report supplied by the analytical laboratory, and the DAR will be prepared by B&N and submitted as part of the Phase II document.

When project-required precision is not achieved and project data are not usable to adequately address environmental questions and to support project decision making, then the DAR should address how this problem will be resolved and discuss the need for resampling.

4.3.2 **Accuracy/Bias**

In order to meet the needs of the data users, project data will follow the measurement performance criteria for accuracy/bias established in Section 1.5.2.

4.3.2.1 **Sample Contamination**

QC check samples data will be reviewed to evaluate the accuracy and potential bias of sample results. If field contamination exists, then the impact of field contamination on data usability will be discussed in the DAR, and the B&N project manager and field team leader should be notified. Differentiate field sample collection and transport contamination from contamination introduced at the time of sample preparation and analysis. Note that sample contamination may result in either negative or positive bias. For example, improperly cleaned sample containers for metals analysis may result in the retention of metals on interior container walls. This would result in lower metals concentrations being reported than are actually present in the environmental sample, which is a negative bias. A positive bias would occur when sample container contamination results in an additive effect, meaning that reported analyte concentrations are higher than the true sample concentrations for that analyte.

4.3.2.2 **Analytical Accuracy/Bias**

The data from method/preparation blank samples, field blank samples, trip blank sample, surrogate spikes, MS/MSD samples, and LCSs will be used to determine accuracy and potential bias of the sample data. If the DVRs indicate that contamination and/or analytical inaccuracies/bias exist for a particular data set, then the impact of that contamination and/or analytical inaccuracies/bias on data usability will be discussed on the DAR.

4.3.2.3 **Overall Accuracy/Bias**

The data from the method/preparation blank samples provide an indication of laboratory contamination that may result in bias of sample data. Sample data associated with method/preparation blank contamination will have been identified during the data verification/validation process. Sample data associated with method/preparation blank contamination are evaluated during data validation procedure to determine if analytes detected in the samples and the associated method/preparation blanks are "real" or are the result of laboratory contamination. The procedure for this evaluation involves comparing the concentration of the analyte in the sample to the concentration of the method/preparation blank taking into account adjustments for sample dilution and dry-weight reporting. In general, the sample data are qualified as not detected if the sample concentration is less than five times (ten times for common laboratory contaminants) the method/preparation blank concentration. Typically, the common QL for the affected analyte is elevated to the concentration detected in the sample.

Please note the paragraph above which discusses validation and qualification of analytical results relating to blank contamination observed with reporting results should not come into play as Ohio EPA VAP criteria is such that any positive analytical results associated with a batch contaminated blank is not reportable, regardless of the level observed in the sample. Redigestion/re-analysis is required until the associated blank is in control. The only allowable reporting of results with a positive contaminated batch blank would be for any sample showing no detections for the analyte in question or less than the laboratory reporting limit. The VAP office does not recognize the batch blank rule (five times or ten times) discussed in the paragraph above.

The data from the field blanks and trip blanks provide an indication of field and transportation conditions that may result in bias of sample data. Sample data associated with contaminated field and trip blank samples have been identified during the data verification/validation process. The evaluation procedure and qualification of sample data associated with field blank and trip blank contamination is performed in the same manner as the evaluation procedure for method blank sample contamination, taking into account the difference in units for aqueous field blank samples collected during soil sampling programs.

Surrogate spike recoveries provide information regarding the accuracy/bias of the organic analyses on an individual sample bias. Surrogate compounds are not expected to be found in the samples and are added to every sample prior to sample preparation/purging. The percent recovery data provide an indication of the effect that the sample matrix may have on the preparation and analysis procedure. Sample data exhibiting matrix effects will have been identified during data verification/validation process.

Matrix spike sample data can provide information regarding the accuracy/bias of the analytical methods relative to the sample matrix. Matrix spike samples are field samples that have been fortified with target analytes prior to sample preparation and analysis. The percent recovery data provide an indication of the effect that the sample matrix may have on the preparation and analysis procedure. Sample data exhibiting matrix effects will have been identified during data verification/validation process.

Analytical accuracy/bias will be determined by evaluating the percent recovery data of LCSs. LCSs are artificial samples prepared in the laboratory using a blank matrix that is fortified with analytes from a standard reference material that is independent of the calibration standards. LCSs are prepared and analyzed in the same manner as the field samples. The data from LCS analyses will provide an indication of the accuracy and bias of the analytical method for each target analyte.

Percent recovery is calculated using the following formula:

$$\%R = \frac{SSR - SR}{SA} \quad X \quad 100$$

where:

SSR = Spiked Sample Result
SR = Sample Result or Background
SA = Spike Added.

The percent recovery of LCSs is determined by dividing the measured value by the true value and multiplying by 100.

Overall accuracy/bias for the sampling events will be determined by calculating the percent accuracy measurements that meet the measurement performance criteria specified in Section 1.5.2 of this QAPP. Overall accuracy will be considered acceptable if the surrogate percent recoveries are met for at least 75 percent of the samples and the LCS percent recoveries are met for all samples and the MS/MSD percent recoveries are met for at least 75 percent of the samples.

The DAR will discuss and compare overall contamination and accuracy/bias data from multiple data sets collected for the project for each matrix, analytical parameter, and concentration level. The DAR will describe the limitations on the use of the project data if extensive contamination and/or inaccuracy/bias exist or when it is limited to a specific sampling or laboratory analytical group, data set, analytical parameter, or concentration level. The DAR will identify qualitative and/or quantitative bias trends in multiple performance evaluation (PE) sample results for each matrix, analytical parameter, and concentration level. The impact of any qualitative and/or quantitative trends in bias on the sample data will be discussed. Any PE samples that have false positive and/or false negative results should be reported and the impact on data usability will be discussed in the DAR.

When project-required accuracy/bias is not achieved and project data are not usable to adequately address environmental questions and to support project decision making, then the DAR will address how this problem will be resolved and the potential need for resampling.

4.3.3 Sample Representativeness

In order to meet the needs of the data users, project data must meet the measurement performance criteria to sample representativeness specified in Section 1.5.3.

Representativeness of the samples will be assessed by reviewing the results of field audits and the data from field duplicate samples. If field duplicate precision checks indicate potential spatial variability, then this may trigger additional scoping meetings and subsequent resampling in order to collect data that are more representative of a nonhomogeneous site. Overall sample representativeness will be determined by calculating the percent of field duplicate sample data that achieved the RPD criteria specified in Section 1.5.3 of this QAPP. Overall sample representativeness will be considered acceptable if the results of the field audits indicate that the approved sampling methods or alternate acceptable sampling methods were used to collect the samples, and the field duplicates RPD data are acceptable for at least 75 percent of the samples.

The DAR will discuss and compare overall representativeness for each matrix, parameter, and concentration level. DARs will describe the limitations on the use of project data when overall nonrepresentative sampling has occurred or when nonrepresentative sampling is limited to a specific sampling group, data set, matrix, analytical parameter, or concentration level. If data are not usable to adequately address environmental questions and/or support project decision making, then the DAR will address how this problem will be resolved and discuss potential need for resampling.

4.3.4 Sensitivity and Quantitation Limits

In order to meet the needs of the data user, project data must meet the measurement performance criteria for sensitivity as specified. Low point calibration standards should produce a signal at least ten times the background noise levels and should be part of a linear calibration curve. Document the procedures for calculating method detection limits (MDLs) and quantitation limits (QLs).

4.3.4.1 Overall Sensitivity and Quantitation Limits

The QLs for the sample data will be reviewed to ensure that the sensitivity of the analyses was sufficient to achieve VAP standards. The method/preparation blank sample data and LCSs percent recovery data will be reviewed to assess compliance with the measurement performance criteria specified in Section 1.5.6 of this QAPP.

Overall sensitivity will be assessed by comparing the sensitivity for each monitoring program to the detectability requirements for the analyses. Overall sensitivity will be considered acceptable if QLs for samples are less than the acceptable evaluation criteria (i.e., VAP standards).

It should be noted that QLs may be elevated as a result of high concentrations of target compounds, nontarget compounds, and matrix interferences (collectively known as sample matrix effects). In these cases, the sensitivity of the analyses will be evaluated on an individual sample basis relative to the applicable evaluation criteria. The need to investigate the use of alternate analytical methods may be required if the sensitivity of the analytical methods identified in this QAPP cannot achieve the evaluation criteria because of sample matrix interference.

If DVRs indicate that sensitivity and/or QLs were not achieved, then the impact of that lack of sensitivity and/or higher QLs on data usability will be discussed in the DAR.

The DAR will discuss and compare overall sensitivity and QLs from multiple data sets collected for the project for each matrix, analytical parameter, and concentration level. The DAR will describe the limitations on the use of the project data if project-required sensitivity and QLs were not achieved for all project data or when it is limited to a specific sampling or laboratory/analytical group, data set, matrix, analytical parameter, or concentration level.

When project-related QLs are not achieved and project data are not usable to adequately address environmental questions and to support project decision making, then the DAR will address how this problem will be resolved and discuss the potential need for resampling. In this case, the DAR will clearly differentiate between usable and unusable data for the users.

4.3.5 Completeness

In order to meet the needs of the data users, project data will follow the measurement performance criteria for data completeness outlined in Section 1.5.4.

4.3.5.1 Overall Completeness

Completeness will be assessed by comparing the number of valid (usable) sample results to the total possible number of results within a specific sample matrix and/or analysis. Percent completeness will be calculated using the following formula:

$$\%\ \text{Completeness} = \frac{\text{Number of Valid (usable) measurements}}{\text{Number of Measurements Planned}} \times 100$$

Overall completeness will be assessed by calculating the mean percent completeness for the entire set of data obtained for each sampling program. The overall completeness for the Phase II will be calculated when all sampling and analysis is concluded. Overall completeness will be considered acceptable if at least 90 percent of the data are determined to be valid.

The DAR will discuss and compare overall completeness of multiple data sets collected for the project for each matrix, analytical parameter, and concentration level. The DAR will describe the limitation on the use of the project data if project-required completeness was not achieved for the overall project or when it is limited to a specific sampling or laboratory/analytical group, data set, analytical parameter, or concentration level.

When project-required completeness is not achieved and sufficient data are not available to adequately address environmental questions and support project decision making, then the DAR will address how this problem will be resolved and discuss the potential need for additional resampling.

4.3.6 Comparability

In order to meet the needs of the data users, project data will follow the measurement performance criteria for comparability outlined in Section 1.5.5.

The comparability of data sets will be evaluated by reviewing the sampling and analysis methods used to generate the data for each data set. Project comparability will be determined to be acceptable if the sampling and analysis methods specified in this QAPP and any approved QAPP revisions or amendments are used for generating the soil, groundwater, sediment, and surface water data.

The DAR will discuss and compare overall comparability between multiple data sets collected for the project for each matrix, analytical parameter, and concentration level. The DAR will describe the limitation on the use of project data when project-required data comparability is not achieved for the overall project or when it is limited to a specific sampling or laboratory/analytical group, data set, matrix, analytical parameter, or concentration level.

For long-term monitoring projects, data comparability is extremely important. Project data will be compared to previously generated data to determine the possibility of false positives and/or false negatives. Variations detected in the data may reflect a changing environment or indicate sampling and/or analytical error. Comparability criteria will be established to evaluate these data sets in order to identify statistical outliers to trigger resampling as verified.

If it is determined that long-term monitoring data are not comparable, the DAR will address whether the data indicate a changing environment or the anomalies are a result of sampling and/or analytical error. If data are not usable to adequately address environmental questions and/or support project decision making, then the DAR will address how this problem will be resolved.

Overall comparability of data from split samples (samples that are collected at the same time from the same location and split equally between two parties using sample containers from the same source or vendor) will be evaluated by determining the RPD of detected analytes in both samples following data verification/validation. Analytes that are detected in only one of the two samples will be assessed by reviewing the data verification/validation reports for both data sets and determining the cause of the discrepancy. Overall comparability of split sample data will be considered acceptable if the RPD for detected analytes with concentrations greater than or equal to five times their respective QLs does not exceed RPD acceptance criteria for field duplicate samples.

If screen/confirmatory comparability criteria are not met, then this will be documented in the DAR and the effect on data usability will be discussed. If oversight split-sampling comparability criteria are not met, then this will be documented in the DAR and the effect on data usability will be discussed. If data are not usable to adequately address environmental questions and/or support project decision making, then the DAR will address how this problem will be resolved and discuss potential need for resampling.

Overall comparability of data from the groundwater monitoring program will be assessed by evaluating analyte concentrations over time. The data from monitoring events will be evaluated for trends, if necessary, using the Mann-Kendall test described in Section 4.3.4.1 of

EPA QA/G-9. Suspected outliers will be assessed using the Extreme Value Test described in Section 4.4.3 of EPA QA/G-9. As the groundwater database becomes larger, it may be necessary to use different statistical methods to determine trends and outliers. Any changes to the statistical methods used for this project will be communicated to the U.S. EPA prior to initiating the change.

4.3.7 Data Limitations and Actions

Sources of sampling and analytical error will be identified and corrected as early as possible to the onset of sample collection activities. An ongoing data assessment process will be incorporated during the project, rather than just as a final step, to facilitate the early detection and correction of problems, ensuring that project quality objectives are met.

Data that do not meet the measurement performance criteria specified in this QAPP will be identified and the impact on the project quality objectives will be assessed and discussed within the Phase II. Specific actions for data that do not meet the measurement performance criteria depend on the use of the data and may require that additional samples are collected or the use of the data to be restricted.

5.0 REFERENCES

U.S. Environmental Protection Agency. 1993. *Data Quality Objectives Process for Superfund: Interim Final Guidance*. EPA 540-R-93-071, Office of Research and Development, Washington DC.

U.S. Environmental Protection Agency. 1994. *Guidance for Data Quality Assessments*. EPA QA/G-5, Office of Research and Development, Washington DC.

U.S. Environmental Protection Agency. 1996. *Guidance for the Data Quality Assessment Process: Practical Methods for Data Analysis*. EPA QA/G-9, Office of Research and Development, Washington DC.

Ohio Environmental Protection Agency. May 2010. *Sample Collection and Evaluation of Vapor Intrusion to Indoor Air for Remedial Response and Voluntary Action Programs Guidance Document*. Ohio EPA – Division of Emergency and Remedial Response.

United States Environmental Protection Agency. 2006. *EPA Requirements for Quality Assurance Project Plans*. EPA QA/R-5, Office of Research and Development, Washington DC.

Table 3a (Revision 1) Pace Analytical Indianapolis Laboratory
SW-846 Methods 6010B (ICP), 7470A/7471A (Mercury), 7196A (Hexavalent Chromium), and Walkley Black (Total Organic Carbon)

Target Analyte	CAS Number	Waters RL (ug/L)	Waters Ohio VAP Limit GUPUS[1] (ug/L)	Waters MDL (ug/L)	Soil/Sediment RL (mg/kg)	Soil/Sediment Ohio VAP Limit GDCSS[2] (mg/kg)	Soil/Sediment MDL (mg/kg)
Aluminum	7429-90-5	1000	n/a	500	50	n/a	25
~~Ammonia~~	~~7664-41-7~~	~~100~~	~~n/a~~	~~50~~	~~n/a~~	~~n/a~~	~~n/a~~
Antimony	7440-36-0	6	6	4.7	2	30	1
Arsenic	7440-38-2	10	10	5	2	6.7	1
Barium	7440-39-3	100	2000	10	2	15000	1
Beryllium	7440-41-7	4	4	2	0.5	150	0.25
Cadmium	7440-43-9	5	5	2.5	2	72	1
Calcium	7440-70-2	1000	n/a	500	50	n/a	25
Chromium, Hexavalent	18540-29-9	10	n/a	5	4	230	3.9
Chromium, Total	7440-47-3	10	100	5	2	110000	1
Cobalt	7440-48-4	50	320	25	2	1400	1
Copper	7440-50-8	20	n/a	10	2	n/a	1
Iron	7439-89-6	100	n/a	50	50	n/a	25
Lead	7439-92-1	10	15	5	2	n/a	1
Manganese	7439-96-5	50	n/a	25	2	n/a	1
Mercury	7439-97-6	2	2	1	0.33	7.6	0.17
Nickel	7440-02-0	50	320	10	2	1500	1
Potassium	7440-09-7	1000	n/a	500	50	n/a	25
Selenium	7782-49-2	10	50	5	2	380	1
Silver	7440-22-4	50	79	25	2	380	1
Sodium	7440-23-5	1000	n/a	500	50	n/a	25
Thallium	7440-28-0	2	2	25	2	6.1	1
Vanadium	7440-62-2	50	130	25	2	680	1
Zinc	7440-66-6	50	4700	20	2	23000	1
Total Organic Carbon[3]	7440-44-0	n/a	n/a	n/a	400.0	n/a	90.12

[1] Generic Unrestricted Potable Use Standard for a Single Chemical - effective date 03/01/2009

[2] Generic Direct Contact Soil Standard for a Single Chemical - Residential Land Use Category - effective date 03/01/2009
Compounds, Reporting Limits and Method Detection Limits are subject to change.

[3] Total Organic Carbon in soil by the Walkley-Black method will be performed by Pace Analtyical's Green Bay, Wisconsin laboratory.

Table 3b (Revision 1) (continued) Pace Analytical Indianapolis Laboratory
SW-846 Methods 6010/7470/7471 Metals, and Total Organic Carbon (Walkley Black Method - Pace Green Bay, Wisconsin Laboratory)

Target Analyte	Method	Waters LCS limits (% recovery)	Waters MS/MSD limits (% recovery)	Waters RPD Limits	Soil/Sediment LCS limits (% recovery)	Soil/Sediment MS/MSD limits (% recovery)	Soil/Sediment RPD Limits
Aluminum	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Antimony	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Arsenic	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Barium	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Beryllium	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Boron	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Cadmium	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Calcium	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Chromium	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Cobalt	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Copper	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Iron	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Lead	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Magnesium	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Manganese	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Mercury	SW-846 7470A/7471A	80-120	75-125	20	80-120	75-125	20
Molybdenum	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Nickel	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Potassium	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Selenium	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Silicon	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Silver	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Sodium	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Tin	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Titanium	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Thallium	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Vanadium	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Zinc	SW-846 6010B	80-120	75-125	20	80-120	75-125	20
Total Organic Carbon	Walkley Black	n/a	n/a	n/a	80-120	80-120	20

Control limits are subject to change without notice.

Table 5 (Revision 1)
Sample Container, Preservation, and Holding Time Requirements
US EPA Brownfield Assessment Grant
Cuyahoga County, Ohio

Matrix	Analysis	Container	Preservation	Holding Time
	Metals	1 - 4 oz glass jar	Cool to less than or equal to 6° C	6 months, mercury 28 days
	Total Organic Carbon (TOC)	1 - 4 oz glass jar	Cool to less than or equal to 6° C	28 days
	VOCs or TPH - GRO using TerraCore sampling methods	3 - 40 ml glass VOA vials and 1 -2 oz or 4 oz glass jar (moisture content)	1 - methonal VOA vial, 2 - DI water VOA vials, and 1glass jar (unpreserved), cool to less than or equal to 6° C.	14 days **DI water filled VOA vials must be frozen at the lab within 48 hours of collection.
	VOCs and TPH - GRO combination samples using TerraCore sampling methods	5 - 40 ml glass VOA vials and 1 -2 oz or 4 oz glass jar (moisture content)	1 - methonal VOA vial, 4 - DI water VOA vials, and1 glass jar (unpreserved), cool to less than or equal to 6° C.	14 days **DI water filled VOA vials must be frozen at the lab within 48 hours of collection.
Bulk	Asbestos	Resealable plastic baggie	none	none
Paint Chips	Lead	Resealable plastic baggie	none	none
Air	VOCs	1 canister (tedlar bags are not be used)	none	30 days

DI = Deionized Water
VOA = Volatile Organic Analysis
TPH = Total Petroleum Hydrocarbons
GRO = Gasoline Range Organics
DRO = Diesel Range Organics
VOCs = Volatile Organic Compounds
SVOCs = Semivolatile Organic Compounds
PAHs = Polynuclear Aromatic Hydrocarbons

Richard W. Thomas

Geologist

Education
Kent State University – BS, Geology 2006

Summary

Mr. Thomas joined Burgess & Niple in 2011 as a geologist in the Hydrogeologic Investigation Section with 5 years of experience. Recent relevant experience includes Bridgestone Firestone – Akron, Ohio, Former Highpoint Trucking Terminal – Richfield, Ohio, and Cedar Center – South Euclid, Ohio Phase I and II ESAs; numerous Phase II and III ESAs across the Southeast USA; numerous remediation projects in the Southeast including Florida, Georgia, North and South Carolina involving solvent, petroleum, and landfill gas substances. Mr. Thomas holds a Bachelor of Science degree in Geology from Kent State University.

Relevant Background

Environmental Site Assessments – Assists in Phase II Environmental Site Assessments (ESAs) in accordance with state and federal guidelines throughout Ohio. Site locations include:

- Bridgestone Americas Tire Operations, Akron, Ohio
- Former Highpoint Trucking Terminal, Richfield, Ohio
- Cedar Center, South Euclid, Ohio

Brownfields Redevelopment – Assists in the investigation of potential hazardous waste areas made possible through the utilization of the Ohio Voluntary Action Program (VAP) and other state programs. Aids in report guidelines for submittal to the Ohio and U.S. Environmental Protection Agency. VAP industrial site locations include:

- Cedar Center: South Euclid, Ohio

U.S. Army Corps of Engineers – Performed environmental tasks for various U.S. Army Corps of Engineers projects in the southeastern United States that have included groundwater sampling, soil sampling, monitoring well installation and abandonment, remedial system design and installations, aboveground and underground storage tank removals, contaminated soil excavations, health and safety oversight, and construction (QA/QC) oversight.

Responsible for day-to-day operations, health and safety oversight, adherence to required QA/QC field procedures, and field documentation. Also responsible for the continued operation and maintenance of an ozone injection system and a landfill gas extraction system.

Extensive experience in groundwater and soil sampling using EPA Region 4 standard sampling procedures. Very familiar with bailers, bladder pumps, peristaltic pumps, submersible pumps, and YSI 556 and LaMotte 2020 water quality meters.

Supervised multiple drilling projects involving monitoring and extraction well installations through Direct Push Technology, Hollow Stem Auger, and Sonic drilling methods.

Office duties include preparation and entry of field data into technical reports for submittal to the United States Amy Corps of Engineers. Field data consists of laboratory analytics, groundwater levels, well construction diagrams, groundwater sampling logs, site maps, and geological maps. Geological mapping consisting of groundwater contour maps and groundwater contamination concentration maps. Experience using AutoCAD to create geological maps.

Certifications and Training

8-Hour OSHA HAZWOPER Refresher, 2011
American Heart Association First Aid and CPR Certification (2 years), 2011
Blood borne Pathogen Standard, 2011
John Zink Institute – Landfill Flares School, 2010
Excavation, Shoring, and Trench Safety, 2010
30-hour Construction Safety and Health 29 CFR 1926, 2009
Aerial Lift Safety, 2008
Construction Quality Management for Contractors Course, 2008
8-hour DOT Hazardous Materials Transport Training, 2008
8-hour Site Supervisor Course, OSHA HAZWOPER, 2007
40-hour OSHA HAZWOPER, 2007

State of Florida

Department of Health, Bureau of Laboratories

This is to certify that

E87948

PACE ANALYTICAL SERVICES, INC - GREEN BAY #1
1241 BELLEVUE STREET
GREEN BAY, WI 54302

has complied with Florida Administrative Code 64E-1,
for the examination of Environmental samples in the following categories

NON-POTABLE WATER - EXTRACTABLE ORGANICS, NON-POTABLE WATER - GENERAL CHEMISTRY, NON-POTABLE WATER - METALS, NON-POTABLE WATER - PESTICIDES-HERBICIDES-PCB'S, NON-POTABLE WATER - VOLATILE ORGANICS, SOLID AND CHEMICAL MATERIALS - EXTRACTABLE ORGANICS, SOLID AND CHEMICAL MATERIALS - GENERAL CHEMISTRY, SOLID AND CHEMICAL MATERIALS - METALS, SOLID AND CHEMICAL MATERIALS - PESTICIDES-HERBICIDES-PCB'S, SOLID AND CHEMICAL MATERIALS - VOLATILE ORGANICS, BIOLOGICAL TISSUE - EXTRACTABLE ORGANICS, BIOLOGICAL TISSUE - GENERAL CHEMISTRY, BIOLOGICAL TISSUE - METALS, BIOLOGICAL TISSUE - PESTICIDES-HERBICIDES-PCB'S

Continued certification is contingent upon successful on-going compliance with the NELAC Standards and FAC Rule 64E-1 regulations. Specific methods and analytes certified are cited on the Laboratory Scope of Accreditation for this laboratory and are on file at the Bureau of Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

Date Issued: July 01, 2011   Expiration Date: June 30, 2012

Max Salfinger, M.D.
Chief, Bureau of Laboratories
Florida Department of Health
DH Form 1697, 7/04
NON-TRANSFERABLE E87948-18-07/01/2011
Supersedes all previously issued certificates

Laboratory Scope of Accreditation

Attachment to Certificate #: E87948-18, expiration date June 30, 2012. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E87948 **EPA Lab Code: WI01103** **(920) 469-2436**

E87948
Pace Analytical Services, Inc - Green Bay #1
1241 Bellevue Street
Green Bay, WI 54302

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,1,1,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,1,1-Trichloroethane	EPA 624	Volatile Organics	NELAP	5/15/2009
1,1,1-Trichloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,1,2,2-Tetrachloroethane	EPA 624	Volatile Organics	NELAP	5/15/2009
1,1,2,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,1,2-Trichloro-1,2,2-trifluoroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,1,2-Trichloroethane	EPA 624	Volatile Organics	NELAP	5/15/2009
1,1,2-Trichloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,1-Dichloroethane	EPA 624	Volatile Organics	NELAP	5/15/2009
1,1-Dichloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,1-Dichloroethylene	EPA 624	Volatile Organics	NELAP	5/15/2009
1,1-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,1-Dichloropropene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2,3-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2,3-Trichloropropane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2,4-Trichlorobenzene	EPA 625	Extractable Organics	NELAP	4/1/2005
1,2,4-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2,4-Trichlorobenzene	EPA 8270	Extractable Organics	NELAP	4/1/2005
1,2,4-Trimethylbenzene	EPA 8021	Volatile Organics	NELAP	5/15/2009
1,2,4-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	5/15/2009
1,2-Dichlorobenzene	EPA 625	Extractable Organics	NELAP	4/1/2005
1,2-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	4/1/2005
1,2-Dichloroethane	EPA 624	Volatile Organics	NELAP	5/15/2009
1,2-Dichloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2-Dichloropropane	EPA 624	Volatile Organics	NELAP	5/15/2009
1,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2-Diphenylhydrazine	EPA 8270	Extractable Organics	NELAP	4/1/2005
1,3,5-Trimethylbenzene	EPA 8021	Volatile Organics	NELAP	5/15/2009
1,3,5-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,3-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	5/15/2009
1,3-Dichlorobenzene	EPA 625	Extractable Organics	NELAP	4/1/2005
1,3-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009

Laboratory Scope of Accreditation

Attachment to Certificate #: E87948-18, expiration date June 30, 2012. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E87948 **EPA Lab Code: WI01103** **(920) 469-2436**

E87948
Pace Analytical Services, Inc - Green Bay #1
1241 Bellevue Street
Green Bay, WI 54302

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,3-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	4/1/2005
1,3-Dichloropropane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,4-Dichlorobenzene	EPA 624	Volatile Organics	NELAP	5/15/2009
1,4-Dichlorobenzene	EPA 625	Extractable Organics	NELAP	4/1/2005
1,4-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,4-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	4/1/2005
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8260	Volatile Organics	NELAP	5/15/2009
2,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	5/15/2009
2,3,4,6-Tetrachlorophenol	EPA 8270	Extractable Organics	NELAP	5/30/2007
2,4,5-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
2,4,6-Trichlorophenol	EPA 625	Extractable Organics	NELAP	4/1/2005
2,4,6-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
2,4-Dichlorophenol	EPA 625	Extractable Organics	NELAP	4/1/2005
2,4-Dichlorophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
2,4-Dimethylphenol	EPA 625	Extractable Organics	NELAP	4/1/2005
2,4-Dimethylphenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
2,4-Dinitrophenol	EPA 625	Extractable Organics	NELAP	4/1/2005
2,4-Dinitrophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
2,4-Dinitrotoluene (2,4-DNT)	EPA 625	Extractable Organics	NELAP	4/1/2005
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270	Extractable Organics	NELAP	4/1/2005
2,6-Dinitrotoluene (2,6-DNT)	EPA 625	Extractable Organics	NELAP	4/1/2005
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270	Extractable Organics	NELAP	4/1/2005
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260	Volatile Organics	NELAP	5/15/2009
2-Chloroethyl vinyl ether	EPA 624	Volatile Organics	NELAP	5/15/2009
2-Chloroethyl vinyl ether	EPA 8260	Volatile Organics	NELAP	5/15/2009
2-Chloronaphthalene	EPA 625	Extractable Organics	NELAP	4/1/2005
2-Chloronaphthalene	EPA 8270	Extractable Organics	NELAP	4/1/2005
2-Chlorophenol	EPA 625	Extractable Organics	NELAP	4/1/2005
2-Chlorophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
2-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	5/15/2009
2-Hexanone	EPA 8260	Volatile Organics	NELAP	5/15/2009
2-Methyl-4,6-dinitrophenol	EPA 625	Extractable Organics	NELAP	4/1/2005
2-Methyl-4,6-dinitrophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
2-Methylnaphthalene	EPA 8270	Extractable Organics	NELAP	4/1/2005
2-Methylphenol (o-Cresol)	EPA 8270	Extractable Organics	NELAP	4/1/2005
2-Nitroaniline	EPA 8270	Extractable Organics	NELAP	4/1/2005

Laboratory Scope of Accreditation

Attachment to Certificate #: E87948-18, expiration date June 30, 2012. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E87948 **EPA Lab Code: WI01103** **(920) 469-2436**

E87948
Pace Analytical Services, Inc - Green Bay #1
1241 Bellevue Street
Green Bay, WI 54302

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
2-Nitrophenol	EPA 625	Extractable Organics	NELAP	4/1/2005
2-Nitrophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
3,3'-Dichlorobenzidine	EPA 625	Extractable Organics	NELAP	4/1/2005
3,3'-Dichlorobenzidine	EPA 8270	Extractable Organics	NELAP	4/1/2005
3/4-Methylphenols (m/p-Cresols)	EPA 8270	Extractable Organics	NELAP	4/1/2005
3-Nitroaniline	EPA 8270	Extractable Organics	NELAP	4/1/2005
4,4'-DDD	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
4,4'-DDE	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
4,4'-DDT	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
4-Bromophenyl phenyl ether	EPA 625	Extractable Organics	NELAP	4/1/2005
4-Bromophenyl phenyl ether	EPA 8270	Extractable Organics	NELAP	4/1/2005
4-Chloro-3-methylphenol	EPA 625	Extractable Organics	NELAP	4/1/2005
4-Chloro-3-methylphenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
4-Chloroaniline	EPA 8270	Extractable Organics	NELAP	4/1/2005
4-Chlorophenyl phenylether	EPA 625	Extractable Organics	NELAP	4/1/2005
4-Chlorophenyl phenylether	EPA 8270	Extractable Organics	NELAP	4/1/2005
4-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	5/15/2009
4-Methyl-2-pentanone (MIBK)	EPA 8260	Volatile Organics	NELAP	5/15/2009
4-Nitroaniline	EPA 8270	Extractable Organics	NELAP	4/1/2005
4-Nitrophenol	EPA 625	Extractable Organics	NELAP	4/1/2005
4-Nitrophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
Acenaphthene	EPA 625	Extractable Organics	NELAP	4/1/2005
Acenaphthene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Acenaphthylene	EPA 625	Extractable Organics	NELAP	4/1/2005
Acenaphthylene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Acetone	EPA 8260	Volatile Organics	NELAP	5/15/2009
Acetonitrile	EPA 8260	Volatile Organics	NELAP	5/15/2009
Acetophenone	EPA 625	Extractable Organics	NELAP	4/1/2005
Acetophenone	EPA 8270	Extractable Organics	NELAP	4/1/2005
Acidity, as CaCO3	EPA 305.1	General Chemistry	NELAP	4/1/2005
Acidity, as CaCO3	SM 2310 B (4a)	General Chemistry	NELAP	5/22/2007
Acrolein (Propenal)	EPA 624	Volatile Organics	NELAP	5/15/2009
Acrolein (Propenal)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Acrylonitrile	EPA 624	Volatile Organics	NELAP	5/15/2009
Acrylonitrile	EPA 8260	Volatile Organics	NELAP	5/15/2009
Aldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007

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Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Alkalinity as CaCO3	EPA 310.2	General Chemistry	NELAP	4/1/2005
Allyl chloride (3-Chloropropene)	EPA 8260	Volatile Organics	NELAP	5/15/2009
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
alpha-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aluminum	EPA 6010	Metals	NELAP	4/1/2005
Aluminum	EPA 6020	Metals	NELAP	4/1/2005
Ammonia as N	EPA 350.1	General Chemistry	NELAP	4/1/2005
Aniline	EPA 625	Extractable Organics	NELAP	4/1/2005
Aniline	EPA 8270	Extractable Organics	NELAP	4/1/2005
Anthracene	EPA 625	Extractable Organics	NELAP	4/1/2005
Anthracene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Antimony	EPA 6010	Metals	NELAP	4/1/2005
Antimony	EPA 6020	Metals	NELAP	4/1/2005
Aroclor-1016 (PCB-1016)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1221 (PCB-1221)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1232 (PCB-1232)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1242 (PCB-1242)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1248 (PCB-1248)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1254 (PCB-1254)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1260 (PCB-1260)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Arsenic	EPA 6010	Metals	NELAP	4/1/2005
Arsenic	EPA 6020	Metals	NELAP	4/1/2005
Barium	EPA 6010	Metals	NELAP	4/1/2005
Barium	EPA 6020	Metals	NELAP	4/1/2005
Benzene	EPA 602	Volatile Organics	NELAP	5/15/2009
Benzene	EPA 624	Volatile Organics	NELAP	5/15/2009
Benzene	EPA 8021	Volatile Organics	NELAP	5/15/2009
Benzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Benzidine	EPA 625	Extractable Organics	NELAP	4/1/2005
Benzidine	EPA 8270	Extractable Organics	NELAP	4/1/2005
Benzo(a)anthracene	EPA 625	Extractable Organics	NELAP	4/1/2005
Benzo(a)anthracene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Benzo(a)pyrene	EPA 625	Extractable Organics	NELAP	4/1/2005
Benzo(a)pyrene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Benzo(b)fluoranthene	EPA 625	Extractable Organics	NELAP	4/1/2005
Benzo(b)fluoranthene	EPA 8270	Extractable Organics	NELAP	4/1/2005

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Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Benzo(g,h,i)perylene	EPA 625	Extractable Organics	NELAP	4/1/2005
Benzo(g,h,i)perylene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Benzo(k)fluoranthene	EPA 625	Extractable Organics	NELAP	4/1/2005
Benzo(k)fluoranthene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Benzoic acid	EPA 8270	Extractable Organics	NELAP	4/1/2005
Benzyl alcohol	EPA 8270	Extractable Organics	NELAP	4/1/2005
Beryllium	EPA 6010	Metals	NELAP	4/1/2005
Beryllium	EPA 6020	Metals	NELAP	4/1/2005
beta-BHC (beta-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Biochemical oxygen demand	SM 5210 B	General Chemistry	NELAP	4/1/2005
bis(2-Chloroethoxy)methane	EPA 625	Extractable Organics	NELAP	4/1/2005
bis(2-Chloroethoxy)methane	EPA 8270	Extractable Organics	NELAP	4/1/2005
bis(2-Chloroethyl) ether	EPA 625	Extractable Organics	NELAP	4/1/2005
bis(2-Chloroethyl) ether	EPA 8270	Extractable Organics	NELAP	4/1/2005
bis(2-Chloroisopropyl) ether (2,2'-Oxybis(1-chloropropane))	EPA 625	Extractable Organics	NELAP	4/1/2005
bis(2-Chloroisopropyl) ether (2,2'-Oxybis(1-chloropropane))	EPA 8270	Extractable Organics	NELAP	4/1/2005
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 625	Extractable Organics	NELAP	4/1/2005
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 8270	Extractable Organics	NELAP	4/1/2005
Boron	EPA 6010	Metals	NELAP	4/1/2005
Boron	EPA 6020	Metals	NELAP	4/1/2005
Bromide	EPA 300.0	General Chemistry	NELAP	4/1/2005
Bromide	EPA 9056	General Chemistry	NELAP	4/1/2005
Bromobenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Bromochloromethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
Bromodichloromethane	EPA 624	Volatile Organics	NELAP	5/15/2009
Bromodichloromethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
Bromoform	EPA 624	Volatile Organics	NELAP	5/15/2009
Bromoform	EPA 8260	Volatile Organics	NELAP	5/15/2009
Butyl benzyl phthalate	EPA 625	Extractable Organics	NELAP	4/1/2005
Butyl benzyl phthalate	EPA 8270	Extractable Organics	NELAP	4/1/2005
Cadmium	EPA 6010	Metals	NELAP	4/1/2005
Cadmium	EPA 6020	Metals	NELAP	4/1/2005
Calcium	EPA 6010	Metals	NELAP	4/1/2005
Calcium	EPA 6020	Metals	NELAP	4/1/2005
Carbazole	EPA 8270	Extractable Organics	NELAP	4/1/2005

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Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Carbon disulfide	EPA 8260	Volatile Organics	NELAP	5/15/2009
Carbon tetrachloride	EPA 624	Volatile Organics	NELAP	5/15/2009
Carbon tetrachloride	EPA 8260	Volatile Organics	NELAP	5/15/2009
Carbonaceous BOD (CBOD)	SM 5210 B	General Chemistry	NELAP	4/1/2005
Chemical oxygen demand	EPA 410.4	General Chemistry	NELAP	4/1/2005
Chlordane (tech.)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Chloride	EPA 300.0	General Chemistry	NELAP	4/1/2005
Chloride	EPA 9056	General Chemistry	NELAP	4/1/2005
Chlorobenzene	EPA 624	Volatile Organics	NELAP	5/15/2009
Chlorobenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Chloroethane	EPA 624	Volatile Organics	NELAP	5/15/2009
Chloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
Chloroform	EPA 624	Volatile Organics	NELAP	5/15/2009
Chloroform	EPA 8260	Volatile Organics	NELAP	5/15/2009
Chloroprene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Chromium	EPA 6010	Metals	NELAP	4/1/2005
Chromium	EPA 6020	Metals	NELAP	4/1/2005
Chromium VI	SM 3500-Cr B (20th/21st Ed.)/UV-VIS	General Chemistry	NELAP	5/30/2007
Chrysene	EPA 625	Extractable Organics	NELAP	4/1/2005
Chrysene	EPA 8270	Extractable Organics	NELAP	4/1/2005
cis-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	5/15/2009
cis-1,3-Dichloropropene	EPA 624	Volatile Organics	NELAP	5/15/2009
cis-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	5/15/2009
cis-1,4-Dichloro-2-butene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Cobalt	EPA 6010	Metals	NELAP	4/1/2005
Cobalt	EPA 6020	Metals	NELAP	4/1/2005
Conductivity	EPA 120.1	General Chemistry	NELAP	4/1/2005
Conductivity	EPA 9050	General Chemistry	NELAP	4/1/2005
Copper	EPA 6010	Metals	NELAP	4/1/2005
Copper	EPA 6020	Metals	NELAP	4/1/2005
delta-BHC	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Dibenz(a,h)anthracene	EPA 625	Extractable Organics	NELAP	4/1/2005
Dibenz(a,h)anthracene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Dibenzofuran	EPA 8270	Extractable Organics	NELAP	4/1/2005
Dibromochloromethane	EPA 624	Volatile Organics	NELAP	5/15/2009
Dibromochloromethane	EPA 8260	Volatile Organics	NELAP	5/15/2009

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Analyte	Method/Tech	Category	Certification Type	Effective Date
Dibromomethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
Dichlorodifluoromethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
Dieldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Diesel range organics (DRO)	EPA 8015	Extractable Organics	NELAP	4/1/2005
Diethyl ether	EPA 8260	Volatile Organics	NELAP	5/15/2009
Diethyl phthalate	EPA 625	Extractable Organics	NELAP	4/1/2005
Diethyl phthalate	EPA 8270	Extractable Organics	NELAP	4/1/2005
Dimethyl phthalate	EPA 625	Extractable Organics	NELAP	4/1/2005
Dimethyl phthalate	EPA 8270	Extractable Organics	NELAP	4/1/2005
Di-n-butyl phthalate	EPA 625	Extractable Organics	NELAP	4/1/2005
Di-n-butyl phthalate	EPA 8270	Extractable Organics	NELAP	4/1/2005
Di-n-octyl phthalate	EPA 625	Extractable Organics	NELAP	4/1/2005
Di-n-octyl phthalate	EPA 8270	Extractable Organics	NELAP	4/1/2005
Endosulfan I	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Endosulfan II	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Endosulfan sulfate	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Endrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Endrin aldehyde	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Endrin ketone	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Ethanol	EPA 8015	Volatile Organics	NELAP	5/15/2009
Ethanol	EPA 8260	Volatile Organics	NELAP	5/15/2009
Ethyl acetate	EPA 8260	Volatile Organics	NELAP	5/15/2009
Ethyl methacrylate	EPA 8260	Volatile Organics	NELAP	5/15/2009
Ethylbenzene	EPA 602	Volatile Organics	NELAP	5/15/2009
Ethylbenzene	EPA 624	Volatile Organics	NELAP	5/15/2009
Ethylbenzene	EPA 8021	Volatile Organics	NELAP	5/15/2009
Ethylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Ethyl-t-butylether (ETBE)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Fluoranthene	EPA 625	Extractable Organics	NELAP	4/1/2005
Fluoranthene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Fluorene	EPA 625	Extractable Organics	NELAP	4/1/2005
Fluorene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Fluoride	EPA 300.0	General Chemistry	NELAP	4/1/2005
Fluoride	EPA 9056	General Chemistry	NELAP	4/1/2005
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
gamma-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007

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Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Gasoline range organics (GRO)	EPA 8015	Volatile Organics	NELAP	5/15/2009
Gasoline range organics (GRO)	WI-GRO	Volatile Organics	NELAP	5/15/2009
Hardness	SM 2340 B	General Chemistry	NELAP	4/1/2005
Heptachlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Heptachlor epoxide	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Hexachlorobenzene	EPA 625	Extractable Organics	NELAP	4/1/2005
Hexachlorobenzene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Hexachlorobutadiene	EPA 625	Extractable Organics	NELAP	4/1/2005
Hexachlorobutadiene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Hexachlorobutadiene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Hexachlorocyclopentadiene	EPA 625	Extractable Organics	NELAP	4/1/2005
Hexachlorocyclopentadiene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Hexachloroethane	EPA 625	Extractable Organics	NELAP	4/1/2005
Hexachloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
Hexachloroethane	EPA 8270	Extractable Organics	NELAP	4/1/2005
Ignitability	EPA 1010	General Chemistry	NELAP	4/1/2005
Indeno(1,2,3-cd)pyrene	EPA 625	Extractable Organics	NELAP	4/1/2005
Indeno(1,2,3-cd)pyrene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Iodomethane (Methyl iodide)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Iron	EPA 6010	Metals	NELAP	4/1/2005
Iron	EPA 6020	Metals	NELAP	4/1/2005
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Isophorone	EPA 625	Extractable Organics	NELAP	4/1/2005
Isophorone	EPA 8270	Extractable Organics	NELAP	4/1/2005
Isopropyl alcohol (2-Propanol)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Isopropylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Kjeldahl nitrogen - total	EPA 351.2	General Chemistry	NELAP	4/1/2005
Lead	EPA 6010	Metals	NELAP	4/1/2005
Lead	EPA 6020	Metals	NELAP	4/1/2005
Lithium	EPA 6020	Metals	NELAP	5/15/2009
m/p-Xylenes	EPA 8021	Volatile Organics	NELAP	5/15/2009
m/p-Xylenes	EPA 8260	Volatile Organics	NELAP	5/15/2009
Magnesium	EPA 6010	Metals	NELAP	4/1/2005
Magnesium	EPA 6020	Metals	NELAP	4/1/2005
Manganese	EPA 6010	Metals	NELAP	4/1/2005
Manganese	EPA 6020	Metals	NELAP	4/1/2005

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Matrix: **Non-Potable Water**

Analyte	Method/Tech	Category	Certification Type	Effective Date
Mercury	EPA 1631	Metals	NELAP	5/30/2007
Mercury	EPA 7470	Metals	NELAP	4/1/2005
Methacrylonitrile	EPA 8260	Volatile Organics	NELAP	5/15/2009
Methanol	EPA 8015	Volatile Organics	NELAP	5/15/2009
Methoxychlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Methyl bromide (Bromomethane)	EPA 624	Volatile Organics	NELAP	5/15/2009
Methyl bromide (Bromomethane)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Methyl chloride (Chloromethane)	EPA 624	Volatile Organics	NELAP	5/15/2009
Methyl chloride (Chloromethane)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Methyl methacrylate	EPA 8260	Volatile Organics	NELAP	5/15/2009
Methyl tert-butyl ether (MTBE)	EPA 8021	Volatile Organics	NELAP	5/15/2009
Methyl tert-butyl ether (MTBE)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Methylene chloride	EPA 624	Volatile Organics	NELAP	5/15/2009
Methylene chloride	EPA 8260	Volatile Organics	NELAP	5/15/2009
Mirex	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Molybdenum	EPA 6010	Metals	NELAP	4/1/2005
Molybdenum	EPA 6020	Metals	NELAP	4/1/2005
Naphthalene	EPA 625	Extractable Organics	NELAP	4/1/2005
Naphthalene	EPA 8021	Volatile Organics	NELAP	5/15/2009
Naphthalene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Naphthalene	EPA 8270	Extractable Organics	NELAP	4/1/2005
n-Butyl alcohol	EPA 8260	Volatile Organics	NELAP	5/15/2009
n-Butylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Nickel	EPA 6010	Metals	NELAP	4/1/2005
Nickel	EPA 6020	Metals	NELAP	4/1/2005
Nitrate	EPA 9056	General Chemistry	NELAP	4/1/2005
Nitrate as N	EPA 300.0	General Chemistry	NELAP	4/1/2005
Nitrite	EPA 9056	General Chemistry	NELAP	4/1/2005
Nitrite as N	EPA 300.0	General Chemistry	NELAP	4/1/2005
Nitrobenzene	EPA 625	Extractable Organics	NELAP	4/1/2005
Nitrobenzene	EPA 8270	Extractable Organics	NELAP	4/1/2005
n-Nitrosodimethylamine	EPA 625	Extractable Organics	NELAP	4/1/2005
n-Nitrosodimethylamine	EPA 8270	Extractable Organics	NELAP	4/1/2005
n-Nitrosodi-n-propylamine	EPA 625	Extractable Organics	NELAP	4/1/2005
n-Nitrosodi-n-propylamine	EPA 8270	Extractable Organics	NELAP	4/1/2005
n-Nitrosodiphenylamine	EPA 625	Extractable Organics	NELAP	4/1/2005

Laboratory Scope of Accreditation

Attachment to Certificate #: E87948-18, expiration date June 30, 2012. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E87948 **EPA Lab Code: WI01103** **(920) 469-2436**

E87948
Pace Analytical Services, Inc - Green Bay #1
1241 Bellevue Street
Green Bay, WI 54302

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
n-Nitrosodiphenylamine	EPA 8270	Extractable Organics	NELAP	4/1/2005
n-Propanol	EPA 8260	Volatile Organics	NELAP	5/15/2009
n-Propylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Organic nitrogen	TKN minus AMMONIA	General Chemistry	NELAP	4/1/2005
o-Xylene	EPA 8021	Volatile Organics	NELAP	5/15/2009
o-Xylene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Pentachlorophenol	EPA 625	Extractable Organics	NELAP	4/1/2005
Pentachlorophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
pH	EPA 150.1	General Chemistry	NELAP	4/1/2005
pH	EPA 9040	General Chemistry	NELAP	4/1/2005
pH	SM 4500-H+-B	General Chemistry	NELAP	5/22/2007
Phenanthrene	EPA 625	Extractable Organics	NELAP	4/1/2005
Phenanthrene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Phenol	EPA 625	Extractable Organics	NELAP	4/1/2005
Phenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
Phosphorus, total	EPA 365.4	General Chemistry	NELAP	4/1/2005
p-Isopropyltoluene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Potassium	EPA 6010	Metals	NELAP	4/1/2005
Potassium	EPA 6020	Metals	NELAP	4/1/2005
Propionitrile (Ethyl cyanide)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Pyrene	EPA 625	Extractable Organics	NELAP	4/1/2005
Pyrene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Pyridine	EPA 625	Extractable Organics	NELAP	4/1/2005
Pyridine	EPA 8270	Extractable Organics	NELAP	4/1/2005
Residue-filterable (TDS)	SM 2540 C	General Chemistry	NELAP	5/30/2007
Residue-nonfilterable (TSS)	SM 2540 D	General Chemistry	NELAP	5/30/2007
Residue-total	SM 2540 B	General Chemistry	NELAP	5/30/2007
Residue-volatile	EPA 160.4	General Chemistry	NELAP	4/1/2005
Residue-volatile	SM 2540 E	General Chemistry	NELAP	5/30/2007
sec-Butylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Selenium	EPA 6010	Metals	NELAP	4/1/2005
Selenium	EPA 6020	Metals	NELAP	4/1/2005
Silver	EPA 6010	Metals	NELAP	4/1/2005
Silver	EPA 6020	Metals	NELAP	4/1/2005
Sodium	EPA 6010	Metals	NELAP	4/1/2005
Sodium	EPA 6020	Metals	NELAP	4/1/2005

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Pace Analytical Services, Inc - Green Bay #1
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Green Bay, WI 54302

Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Strontium	EPA 6020	Metals	NELAP	5/30/2007
Styrene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Sulfate	EPA 300.0	General Chemistry	NELAP	4/1/2005
Sulfate	EPA 9056	General Chemistry	NELAP	4/1/2005
Sulfide	SM 4500-S F (20th/21st Ed.)	General Chemistry	NELAP	1/30/2008
T-amylmethylether (TAME)	EPA 8260	Volatile Organics	NELAP	5/15/2009
tert-Butyl alcohol	EPA 8260	Volatile Organics	NELAP	5/15/2009
tert-Butylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Tetrachloroethylene (Perchloroethylene)	EPA 624	Volatile Organics	NELAP	5/15/2009
Tetrachloroethylene (Perchloroethylene)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Thallium	EPA 6010	Metals	NELAP	4/1/2005
Thallium	EPA 6020	Metals	NELAP	4/1/2005
Tin	EPA 6010	Metals	NELAP	4/1/2005
Titanium	EPA 6010	Metals	NELAP	4/1/2005
Titanium	EPA 6020	Metals	NELAP	5/30/2007
Toluene	EPA 602	Volatile Organics	NELAP	5/15/2009
Toluene	EPA 624	Volatile Organics	NELAP	5/15/2009
Toluene	EPA 8021	Volatile Organics	NELAP	5/15/2009
Toluene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Total cyanide	EPA 335.4	General Chemistry	NELAP	4/1/2005
Total cyanide	EPA 9012	General Chemistry	NELAP	4/1/2005
Total nitrate-nitrite	EPA 300.0	General Chemistry	NELAP	4/1/2005
Total nitrate-nitrite	EPA 353.2	General Chemistry	NELAP	4/1/2005
Total nitrate-nitrite	EPA 9056	General Chemistry	NELAP	4/1/2005
Total organic carbon	EPA 9060	General Chemistry	NELAP	6/24/2011
Total organic carbon	SM 5310 C	General Chemistry	NELAP	6/24/2011
Toxaphene (Chlorinated camphene)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
trans-1,2-Dichloroethylene	EPA 624	Volatile Organics	NELAP	5/15/2009
trans-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	5/15/2009
trans-1,3-Dichloropropylene	EPA 624	Volatile Organics	NELAP	5/15/2009
trans-1,3-Dichloropropylene	EPA 8260	Volatile Organics	NELAP	5/15/2009
trans-1,4-Dichloro-2-butene	EPA 8260	Volatile Organics	NELAP	5/15/2009
trans-Nonachlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Trichloroethene (Trichloroethylene)	EPA 624	Volatile Organics	NELAP	5/15/2009
Trichloroethene (Trichloroethylene)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Trichlorofluoromethane	EPA 624	Volatile Organics	NELAP	5/15/2009

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Matrix: Non-Potable Water

Analyte	Method/Tech	Category	Certification Type	Effective Date
Trichlorofluoromethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
Turbidity	SM 2130 B	General Chemistry	NELAP	4/1/2005
Vanadium	EPA 6010	Metals	NELAP	4/1/2005
Vanadium	EPA 6020	Metals	NELAP	4/1/2005
Vinyl acetate	EPA 8260	Volatile Organics	NELAP	5/15/2009
Vinyl chloride	EPA 624	Volatile Organics	NELAP	5/15/2009
Vinyl chloride	EPA 8260	Volatile Organics	NELAP	5/15/2009
Xylene (total)	EPA 602	Volatile Organics	NELAP	5/15/2009
Xylene (total)	EPA 624	Volatile Organics	NELAP	5/15/2009
Xylene (total)	EPA 8021	Volatile Organics	NELAP	5/15/2009
Xylene (total)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Zinc	EPA 6010	Metals	NELAP	4/1/2005
Zinc	EPA 6020	Metals	NELAP	4/1/2005

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E87948
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Green Bay, WI 54302

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,1,1,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,1,1-Trichloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,1,2,2-Tetrachloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,1,2-Trichloro-1,2,2-trifluoroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,1,2-Trichloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,1-Dichloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,1-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,1-Dichloropropene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2,3-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2,3-Trichloropropane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2,4-Trichlorobenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2,4-Trichlorobenzene	EPA 8270	Extractable Organics	NELAP	4/1/2005
1,2,4-Trimethylbenzene	EPA 8021	Volatile Organics	NELAP	5/15/2009
1,2,4-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2-Dibromo-3-chloropropane (DBCP)	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2-Dibromoethane (EDB, Ethylene dibromide)	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	4/1/2005
1,2-Dichloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,2-Diphenylhydrazine	EPA 8270	Extractable Organics	NELAP	4/1/2005
1,3,5-Trimethylbenzene	EPA 8021	Volatile Organics	NELAP	5/15/2009
1,3,5-Trimethylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,3-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,3-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	4/1/2005
1,3-Dichloropropane	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,4-Dichlorobenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
1,4-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	4/1/2005
1,4-Dioxane (1,4-Diethyleneoxide)	EPA 8260	Volatile Organics	NELAP	5/15/2009
2,2-Dichloropropane	EPA 8260	Volatile Organics	NELAP	5/15/2009
2,3,4,6-Tetrachlorophenol	EPA 8270	Extractable Organics	NELAP	5/30/2007
2,4,5-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
2,4,6-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
2,4-Dichlorophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
2,4-Dimethylphenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
2,4-Dinitrophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005

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Pace Analytical Services, Inc - Green Bay #1
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Green Bay, WI 54302

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270	Extractable Organics	NELAP	4/1/2005
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270	Extractable Organics	NELAP	4/1/2005
2-Butanone (Methyl ethyl ketone, MEK)	EPA 8260	Volatile Organics	NELAP	5/15/2009
2-Chloroethyl vinyl ether	EPA 8260	Volatile Organics	NELAP	5/15/2009
2-Chloronaphthalene	EPA 8270	Extractable Organics	NELAP	4/1/2005
2-Chlorophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
2-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	5/15/2009
2-Hexanone	EPA 8260	Volatile Organics	NELAP	5/15/2009
2-Methyl-4,6-dinitrophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
2-Methylnaphthalene	EPA 8270	Extractable Organics	NELAP	4/1/2005
2-Methylphenol (o-Cresol)	EPA 8270	Extractable Organics	NELAP	4/1/2005
2-Nitroaniline	EPA 8270	Extractable Organics	NELAP	4/1/2005
2-Nitrophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
3,3'-Dichlorobenzidine	EPA 8270	Extractable Organics	NELAP	4/1/2005
3/4-Methylphenols (m/p-Cresols)	EPA 8270	Extractable Organics	NELAP	4/1/2005
3-Nitroaniline	EPA 8270	Extractable Organics	NELAP	4/1/2005
4,4'-DDD	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
4,4'-DDE	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
4,4'-DDT	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
4-Bromophenyl phenyl ether	EPA 8270	Extractable Organics	NELAP	4/1/2005
4-Chloro-3-methylphenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
4-Chloroaniline	EPA 8270	Extractable Organics	NELAP	4/1/2005
4-Chlorophenyl phenylether	EPA 8270	Extractable Organics	NELAP	4/1/2005
4-Chlorotoluene	EPA 8260	Volatile Organics	NELAP	5/15/2009
4-Methyl-2-pentanone (MIBK)	EPA 8260	Volatile Organics	NELAP	5/15/2009
4-Nitroaniline	EPA 8270	Extractable Organics	NELAP	4/1/2005
4-Nitrophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
Acenaphthene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Acenaphthylene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Acetone	EPA 8260	Volatile Organics	NELAP	5/15/2009
Acetonitrile	EPA 8260	Volatile Organics	NELAP	5/15/2009
Acetophenone	EPA 8270	Extractable Organics	NELAP	4/1/2005
Acrolein (Propenal)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Acrylonitrile	EPA 8260	Volatile Organics	NELAP	5/15/2009
Aldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Allyl chloride (3-Chloropropene)	EPA 8260	Volatile Organics	NELAP	5/15/2009

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Pace Analytical Services, Inc - Green Bay #1
1241 Bellevue Street
Green Bay, WI 54302

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
alpha-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aluminum	EPA 6010	Metals	NELAP	4/1/2005
Aluminum	EPA 6020	Metals	NELAP	4/1/2005
Ammonia as N	EPA 350.1	General Chemistry	NELAP	4/1/2005
Aniline	EPA 8270	Extractable Organics	NELAP	4/1/2005
Anthracene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Antimony	EPA 6010	Metals	NELAP	4/1/2005
Antimony	EPA 6020	Metals	NELAP	4/1/2005
Aroclor-1016 (PCB-1016)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1221 (PCB-1221)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1232 (PCB-1232)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1242 (PCB-1242)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1248 (PCB-1248)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1254 (PCB-1254)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1260 (PCB-1260)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Arsenic	EPA 6010	Metals	NELAP	4/1/2005
Arsenic	EPA 6020	Metals	NELAP	4/1/2005
Barium	EPA 6010	Metals	NELAP	4/1/2005
Barium	EPA 6020	Metals	NELAP	4/1/2005
Benzene	EPA 8021	Volatile Organics	NELAP	5/15/2009
Benzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Benzidine	EPA 8270	Extractable Organics	NELAP	4/1/2005
Benzo(a)anthracene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Benzo(a)pyrene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Benzo(b)fluoranthene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Benzo(g,h,i)perylene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Benzo(k)fluoranthene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Benzoic acid	EPA 8270	Extractable Organics	NELAP	4/1/2005
Benzyl alcohol	EPA 8270	Extractable Organics	NELAP	4/1/2005
Beryllium	EPA 6010	Metals	NELAP	4/1/2005
Beryllium	EPA 6020	Metals	NELAP	4/1/2005
beta-BHC (beta-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
bis(2-Chloroethoxy)methane	EPA 8270	Extractable Organics	NELAP	4/1/2005
bis(2-Chloroethyl) ether	EPA 8270	Extractable Organics	NELAP	4/1/2005
bis(2-Chloroisopropyl) ether (2,2'-Oxybis(1-chloropropane))	EPA 8270	Extractable Organics	NELAP	4/1/2005

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Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 8270	Extractable Organics	NELAP	4/1/2005
Boron	EPA 6010	Metals	NELAP	4/1/2005
Boron	EPA 6020	Metals	NELAP	4/1/2005
Bromobenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Bromochloromethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
Bromodichloromethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
Bromoform	EPA 8260	Volatile Organics	NELAP	5/15/2009
Butyl benzyl phthalate	EPA 8270	Extractable Organics	NELAP	4/1/2005
Cadmium	EPA 6010	Metals	NELAP	4/1/2005
Cadmium	EPA 6020	Metals	NELAP	4/1/2005
Calcium	EPA 6010	Metals	NELAP	4/1/2005
Calcium	EPA 6020	Metals	NELAP	4/1/2005
Carbazole	EPA 8270	Extractable Organics	NELAP	4/1/2005
Carbon disulfide	EPA 8260	Volatile Organics	NELAP	5/15/2009
Carbon tetrachloride	EPA 8260	Volatile Organics	NELAP	5/15/2009
Chlordane (tech.)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Chlorobenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Chloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
Chloroform	EPA 8260	Volatile Organics	NELAP	5/15/2009
Chloroprene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Chromium	EPA 6010	Metals	NELAP	4/1/2005
Chromium	EPA 6020	Metals	NELAP	4/1/2005
Chrysene	EPA 8270	Extractable Organics	NELAP	4/1/2005
cis-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	5/15/2009
cis-1,3-Dichloropropene	EPA 8260	Volatile Organics	NELAP	5/15/2009
cis-1,4-Dichloro-2-butene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Cobalt	EPA 6010	Metals	NELAP	4/1/2005
Cobalt	EPA 6020	Metals	NELAP	4/1/2005
Copper	EPA 6010	Metals	NELAP	4/1/2005
Copper	EPA 6020	Metals	NELAP	4/1/2005
delta-BHC	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Dibenz(a,h)anthracene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Dibenzofuran	EPA 8270	Extractable Organics	NELAP	4/1/2005
Dibromochloromethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
Dibromomethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
Dichlorodifluoromethane	EPA 8260	Volatile Organics	NELAP	5/15/2009

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Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
Dieldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Diesel range organics (DRO)	EPA 8015	Extractable Organics	NELAP	4/1/2005
Diethyl ether	EPA 8260	Volatile Organics	NELAP	5/15/2009
Diethyl phthalate	EPA 8270	Extractable Organics	NELAP	4/1/2005
Dimethyl phthalate	EPA 8270	Extractable Organics	NELAP	4/1/2005
Di-n-butyl phthalate	EPA 8270	Extractable Organics	NELAP	4/1/2005
Di-n-octyl phthalate	EPA 8270	Extractable Organics	NELAP	4/1/2005
Endosulfan I	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Endosulfan II	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Endosulfan sulfate	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Endrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Endrin aldehyde	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Endrin ketone	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Ethanol	EPA 8260	Volatile Organics	NELAP	5/15/2009
Ethyl acetate	EPA 8260	Volatile Organics	NELAP	5/15/2009
Ethyl methacrylate	EPA 8260	Volatile Organics	NELAP	5/15/2009
Ethylbenzene	EPA 8021	Volatile Organics	NELAP	5/15/2009
Ethylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Ethyl-t-butylether (ETBE)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Fluoranthene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Fluorene	EPA 8270	Extractable Organics	NELAP	4/1/2005
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
gamma-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Gasoline range organics (GRO)	EPA 8015	Extractable Organics	NELAP	5/15/2009
Gasoline range organics (GRO)	WI-GRO	Extractable Organics	NELAP	5/15/2009
Heptachlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Heptachlor epoxide	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Hexachlorobenzene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Hexachlorobutadiene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Hexachlorobutadiene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Hexachlorocyclopentadiene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Hexachloroethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
Hexachloroethane	EPA 8270	Extractable Organics	NELAP	4/1/2005
Ignitability	EPA 1010	General Chemistry	NELAP	4/1/2005
Indeno(1,2,3-cd)pyrene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Iodomethane (Methyl iodide)	EPA 8260	Volatile Organics	NELAP	5/15/2009

Laboratory Scope of Accreditation

Attachment to Certificate #: E87948-18, expiration date June 30, 2012. This listing of accredited analytes should be used only when associated with a valid certificate.

State Laboratory ID: E87948 **EPA Lab Code: WI01103** **(920) 469-2436**

E87948
Pace Analytical Services, Inc - Green Bay #1
1241 Bellevue Street
Green Bay, WI 54302

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
Iron	EPA 6010	Metals	NELAP	4/1/2005
Iron	EPA 6020	Metals	NELAP	4/1/2005
Isobutyl alcohol (2-Methyl-1-propanol)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Isophorone	EPA 8270	Extractable Organics	NELAP	4/1/2005
Isopropyl alcohol (2-Propanol)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Isopropylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Kjeldahl nitrogen - total	EPA 351.2	General Chemistry	NELAP	4/1/2005
Lead	EPA 6010	Metals	NELAP	4/1/2005
Lead	EPA 6020	Metals	NELAP	4/1/2005
Lithium	EPA 6020	Metals	NELAP	5/15/2009
Magnesium	EPA 6010	Metals	NELAP	4/1/2005
Magnesium	EPA 6020	Metals	NELAP	4/1/2005
Manganese	EPA 6010	Metals	NELAP	4/1/2005
Manganese	EPA 6020	Metals	NELAP	4/1/2005
Mercury	EPA 7471	Metals	NELAP	4/1/2005
Methacrylonitrile	EPA 8260	Volatile Organics	NELAP	5/15/2009
Methoxychlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Methyl bromide (Bromomethane)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Methyl chloride (Chloromethane)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Methyl methacrylate	EPA 8260	Volatile Organics	NELAP	5/15/2009
Methyl tert-butyl ether (MTBE)	EPA 8021	Volatile Organics	NELAP	5/15/2009
Methyl tert-butyl ether (MTBE)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Methylene chloride	EPA 8260	Volatile Organics	NELAP	5/15/2009
Mirex	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Molybdenum	EPA 6010	Metals	NELAP	4/1/2005
Molybdenum	EPA 6020	Metals	NELAP	4/1/2005
Naphthalene	EPA 8021	Volatile Organics	NELAP	5/15/2009
Naphthalene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Naphthalene	EPA 8270	Extractable Organics	NELAP	4/1/2005
n-Butyl alcohol	EPA 8260	Volatile Organics	NELAP	5/15/2009
n-Butylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Nickel	EPA 6010	Metals	NELAP	4/1/2005
Nickel	EPA 6020	Metals	NELAP	4/1/2005
Nitrobenzene	EPA 8270	Extractable Organics	NELAP	4/1/2005
n-Nitrosodimethylamine	EPA 8270	Extractable Organics	NELAP	4/1/2005
n-Nitrosodi-n-propylamine	EPA 8270	Extractable Organics	NELAP	4/1/2005

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State Laboratory ID: E87948 **EPA Lab Code: WI01103** **(920) 469-2436**

E87948
Pace Analytical Services, Inc - Green Bay #1
1241 Bellevue Street
Green Bay, WI 54302

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
n-Nitrosodiphenylamine	EPA 8270	Extractable Organics	NELAP	4/1/2005
n-Propanol	EPA 8260	Volatile Organics	NELAP	5/15/2009
n-Propylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Organic nitrogen	TKN minus AMMONIA	General Chemistry	NELAP	4/1/2005
Paint Filter Liquids Test	EPA 9095	General Chemistry	NELAP	4/1/2005
Pentachlorophenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
Percent (%) moisture	ASTM D2974-87	General Chemistry	NELAP	5/15/2009
pH	EPA 9040	General Chemistry	NELAP	4/1/2005
pH	EPA 9045	General Chemistry	NELAP	4/1/2005
Phenanthrene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Phenol	EPA 8270	Extractable Organics	NELAP	4/1/2005
Phosphorus, total	EPA 365.4	General Chemistry	NELAP	4/1/2005
p-Isopropyltoluene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Potassium	EPA 6010	Metals	NELAP	4/1/2005
Potassium	EPA 6020	Metals	NELAP	4/1/2005
Propionitrile (Ethyl cyanide)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Pyrene	EPA 8270	Extractable Organics	NELAP	4/1/2005
Pyridine	EPA 8270	Extractable Organics	NELAP	4/1/2005
sec-Butylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Selenium	EPA 6010	Metals	NELAP	4/1/2005
Selenium	EPA 6020	Metals	NELAP	4/1/2005
Silver	EPA 6010	Metals	NELAP	4/1/2005
Silver	EPA 6020	Metals	NELAP	4/1/2005
Sodium	EPA 6010	Metals	NELAP	4/1/2005
Sodium	EPA 6020	Metals	NELAP	4/1/2005
Strontium	EPA 6020	Metals	NELAP	5/30/2007
Styrene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Synthetic Precipitation Leaching Procedure	EPA 1312	General Chemistry	NELAP	4/1/2005
T-amylmethylether (TAME)	EPA 8260	Volatile Organics	NELAP	5/15/2009
tert-Butyl alcohol	EPA 8260	Volatile Organics	NELAP	5/15/2009
tert-Butylbenzene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Tetrachloroethylene (Perchloroethylene)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Thallium	EPA 6010	Metals	NELAP	4/1/2005
Thallium	EPA 6020	Metals	NELAP	4/1/2005
Tin	EPA 6010	Metals	NELAP	4/1/2005
Titanium	EPA 6010	Metals	NELAP	4/1/2005

Laboratory Scope of Accreditation

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State Laboratory ID: E87948 **EPA Lab Code: WI01103** **(920) 469-2436**

E87948
Pace Analytical Services, Inc - Green Bay #1
1241 Bellevue Street
Green Bay, WI 54302

Matrix: Solid and Chemical Materials

Analyte	Method/Tech	Category	Certification Type	Effective Date
Titanium	EPA 6020	Metals	NELAP	5/30/2007
Toluene	EPA 8021	Volatile Organics	NELAP	5/15/2009
Toluene	EPA 8260	Volatile Organics	NELAP	5/15/2009
Total cyanide	EPA 9012	General Chemistry	NELAP	4/1/2005
Total nitrate-nitrite	EPA 353.2	General Chemistry	NELAP	4/1/2005
Total nitrogen	TKN + Total nitrate-nitrite	General Chemistry	NELAP	4/1/2005
Total organic carbon	EPA 9060	General Chemistry	NELAP	5/30/2007
Toxaphene (Chlorinated camphene)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Toxicity Characteristic Leaching Procedure	EPA 1311	General Chemistry	NELAP	4/1/2005
trans-1,2-Dichloroethylene	EPA 8260	Volatile Organics	NELAP	5/15/2009
trans-1,3-Dichloropropylene	EPA 8260	Volatile Organics	NELAP	5/15/2009
trans-1,4-Dichloro-2-butene	EPA 8260	Volatile Organics	NELAP	5/15/2009
trans-Nonachlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Trichloroethene (Trichloroethylene)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Trichlorofluoromethane	EPA 8260	Volatile Organics	NELAP	5/15/2009
Vanadium	EPA 6010	Metals	NELAP	4/1/2005
Vanadium	EPA 6020	Metals	NELAP	4/1/2005
Vinyl acetate	EPA 8260	Volatile Organics	NELAP	5/15/2009
Vinyl chloride	EPA 8260	Volatile Organics	NELAP	5/15/2009
Xylene (total)	EPA 8021	Volatile Organics	NELAP	5/15/2009
Xylene (total)	EPA 8260	Volatile Organics	NELAP	5/15/2009
Zinc	EPA 6010	Metals	NELAP	4/1/2005
Zinc	EPA 6020	Metals	NELAP	4/1/2005

Laboratory Scope of Accreditation

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State Laboratory ID: E87948 **EPA Lab Code:** WI01103 (920) 469-2436

E87948
Pace Analytical Services, Inc - Green Bay #1
1241 Bellevue Street
Green Bay, WI 54302

Matrix: Biological Tissue

Analyte	Method/Tech	Category	Certification Type	Effective Date
1,2,4-Trichlorobenzene	EPA 8270	Extractable Organics	NELAP	5/30/2007
1,2-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	5/30/2007
1,3-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	5/30/2007
1,4-Dichlorobenzene	EPA 8270	Extractable Organics	NELAP	5/30/2007
2,4,5-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	5/30/2007
2,4,6-Trichlorophenol	EPA 8270	Extractable Organics	NELAP	5/30/2007
2,4-Dichlorophenol	EPA 8270	Extractable Organics	NELAP	5/30/2007
2,4-Dimethylphenol	EPA 8270	Extractable Organics	NELAP	5/30/2007
2,4-Dinitrophenol	EPA 8270	Extractable Organics	NELAP	5/30/2007
2,4-Dinitrotoluene (2,4-DNT)	EPA 8270	Extractable Organics	NELAP	5/30/2007
2,6-Dinitrotoluene (2,6-DNT)	EPA 8270	Extractable Organics	NELAP	5/30/2007
2-Chloronaphthalene	EPA 8270	Extractable Organics	NELAP	5/30/2007
2-Chlorophenol	EPA 8270	Extractable Organics	NELAP	5/30/2007
2-Methyl-4,6-dinitrophenol	EPA 8270	Extractable Organics	NELAP	5/30/2007
2-Methylnaphthalene	EPA 8270	Extractable Organics	NELAP	5/30/2007
2-Methylphenol (o-Cresol)	EPA 8270	Extractable Organics	NELAP	5/30/2007
2-Nitroaniline	EPA 8270	Extractable Organics	NELAP	5/30/2007
2-Nitrophenol	EPA 8270	Extractable Organics	NELAP	5/30/2007
3,3'-Dichlorobenzidine	EPA 8270	Extractable Organics	NELAP	5/30/2007
3/4-Methylphenols (m/p-Cresols)	EPA 8270	Extractable Organics	NELAP	5/30/2007
3-Nitroaniline	EPA 8270	Extractable Organics	NELAP	5/30/2007
4,4'-DDD	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
4,4'-DDE	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
4,4'-DDT	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
4-Bromophenyl phenyl ether	EPA 8270	Extractable Organics	NELAP	5/30/2007
4-Chloro-3-methylphenol	EPA 8270	Extractable Organics	NELAP	5/30/2007
4-Chloroaniline	EPA 8270	Extractable Organics	NELAP	5/30/2007
4-Chlorophenyl phenylether	EPA 8270	Extractable Organics	NELAP	5/30/2007
4-Nitroaniline	EPA 8270	Extractable Organics	NELAP	5/30/2007
4-Nitrophenol	EPA 8270	Extractable Organics	NELAP	5/30/2007
Acenaphthene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Acenaphthylene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Aldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
alpha-BHC (alpha-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
alpha-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aluminum	EPA 6020	Metals	NELAP	5/30/2007

Laboratory Scope of Accreditation

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State Laboratory ID: E87948 **EPA Lab Code: WI01103** **(920) 469-2436**

E87948
Pace Analytical Services, Inc - Green Bay #1
1241 Bellevue Street
Green Bay, WI 54302

Matrix: Biological Tissue

Analyte	Method/Tech	Category	Certification Type	Effective Date
Anthracene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Antimony	EPA 6020	Metals	NELAP	5/30/2007
Aroclor-1016 (PCB-1016)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1221 (PCB-1221)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1232 (PCB-1232)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1242 (PCB-1242)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1248 (PCB-1248)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1254 (PCB-1254)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Aroclor-1260 (PCB-1260)	EPA 8082	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Arsenic	EPA 6020	Metals	NELAP	5/30/2007
Barium	EPA 6020	Metals	NELAP	5/30/2007
Benzo(a)anthracene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Benzo(a)pyrene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Benzo(b)fluoranthene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Benzo(g,h,i)perylene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Benzo(k)fluoranthene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Beryllium	EPA 6020	Metals	NELAP	5/30/2007
beta-BHC (beta-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
bis(2-Chloroethoxy)methane	EPA 8270	Extractable Organics	NELAP	5/30/2007
bis(2-Chloroethyl) ether	EPA 8270	Extractable Organics	NELAP	5/30/2007
bis(2-Chloroisopropyl) ether (2,2'-Oxybis(1-chloropropane))	EPA 8270	Extractable Organics	NELAP	5/30/2007
bis(2-Ethylhexyl) phthalate (DEHP)	EPA 8270	Extractable Organics	NELAP	5/30/2007
Boron	EPA 6020	Metals	NELAP	5/30/2007
Butyl benzyl phthalate	EPA 8270	Extractable Organics	NELAP	5/30/2007
Cadmium	EPA 6020	Metals	NELAP	5/30/2007
Calcium	EPA 6020	Metals	NELAP	5/30/2007
Carbazole	EPA 8270	Extractable Organics	NELAP	5/30/2007
Chlordane (tech.)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Chromium	EPA 6020	Metals	NELAP	5/30/2007
Chrysene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Cobalt	EPA 6020	Metals	NELAP	5/30/2007
Copper	EPA 6020	Metals	NELAP	5/30/2007
delta-BHC	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Dibenz(a,h)anthracene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Dibenzofuran	EPA 8270	Extractable Organics	NELAP	5/30/2007
Dieldrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007

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E87948
Pace Analytical Services, Inc - Green Bay #1
1241 Bellevue Street
Green Bay, WI 54302

Matrix: Biological Tissue

Analyte	Method/Tech	Category	Certification Type	Effective Date
Diethyl phthalate	EPA 8270	Extractable Organics	NELAP	5/30/2007
Dimethyl phthalate	EPA 8270	Extractable Organics	NELAP	5/30/2007
Di-n-butyl phthalate	EPA 8270	Extractable Organics	NELAP	5/30/2007
Di-n-octyl phthalate	EPA 8270	Extractable Organics	NELAP	5/30/2007
Endosulfan I	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Endosulfan II	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Endosulfan sulfate	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Endrin	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Endrin aldehyde	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Endrin ketone	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Fluoranthene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Fluorene	EPA 8270	Extractable Organics	NELAP	5/30/2007
gamma-BHC (Lindane, gamma-Hexachlorocyclohexane)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
gamma-Chlordane	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Heptachlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Heptachlor epoxide	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Hexachlorobenzene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Hexachlorobutadiene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Hexachlorocyclopentadiene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Hexachloroethane	EPA 8270	Extractable Organics	NELAP	5/30/2007
Indeno(1,2,3-cd)pyrene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Iron	EPA 6020	Metals	NELAP	5/30/2007
Isophorone	EPA 8270	Extractable Organics	NELAP	5/30/2007
Lead	EPA 6020	Metals	NELAP	5/30/2007
Lithium	EPA 6020	Metals	NELAP	5/15/2009
Magnesium	EPA 6020	Metals	NELAP	5/30/2007
Manganese	EPA 6020	Metals	NELAP	5/30/2007
Mercury	EPA 245.6	General Chemistry	NELAP	5/30/2007
Mercury	EPA 7471	Metals	NELAP	5/30/2007
Methoxychlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Mirex	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Molybdenum	EPA 6020	Metals	NELAP	5/30/2007
Naphthalene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Nickel	EPA 6020	Metals	NELAP	5/30/2007
Nitrobenzene	EPA 8270	Extractable Organics	NELAP	5/30/2007
n-Nitrosodi-n-propylamine	EPA 8270	Extractable Organics	NELAP	5/30/2007

Laboratory Scope of Accreditation

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E87948
Pace Analytical Services, Inc - Green Bay #1
1241 Bellevue Street
Green Bay, WI 54302

Matrix: Biological Tissue

Analyte	Method/Tech	Category	Certification Type	Effective Date
n-Nitrosodiphenylamine	EPA 8270	Extractable Organics	NELAP	5/30/2007
Pentachlorophenol	EPA 8270	Extractable Organics	NELAP	5/30/2007
Phenanthrene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Phenol	EPA 8270	Extractable Organics	NELAP	5/30/2007
Potassium	EPA 6020	Metals	NELAP	5/30/2007
Pyrene	EPA 8270	Extractable Organics	NELAP	5/30/2007
Selenium	EPA 6020	Metals	NELAP	5/30/2007
Silver	EPA 6020	Metals	NELAP	5/30/2007
Sodium	EPA 6020	Metals	NELAP	5/30/2007
Strontium	EPA 6020	Metals	NELAP	5/30/2007
Thallium	EPA 6020	Metals	NELAP	5/30/2007
Titanium	EPA 6020	Metals	NELAP	5/30/2007
Toxaphene (Chlorinated camphene)	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
trans-Nonachlor	EPA 8081	Pesticides-Herbicides-PCB's	NELAP	5/30/2007
Vanadium	EPA 6020	Metals	NELAP	5/30/2007
Zinc	EPA 6020	Metals	NELAP	5/30/2007

Ohio | **Environmental Protection Agency**

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Division of Environmental Response and Revitalization
Voluntary Action Program

Under the authority of Ohio Revised Code Section 3746.04(B)(6) and Ohio Administrative Code Rule 3745-300-04

Certifies

TestAmerica Laboratories, Inc.
4101 Shuffel Street NW
North Canton, Ohio 44720

as a

Certified Laboratory

(Number CL0024)

for the following analytes, parameter groups, and methods:

Aluminum/6010B	Manganese/6010B, 6020	Potassium/6010B	Total Petroleum Hydrocarbons, Light Distillates/8015A-modified
Antimony/6010B, 6020	Nickel/601B, 6020	Mercury/7470A*, 7471A	Semi-Volatile Organic Compounds/8270C
Barium/6010B, 6020	Hexavalent Chromium/7196A	Organochlorine Pesticides 8081A	Total Petroleum Hydrocarbons, Middle & Heavy Distillates/8015B
Beryllium/6010B, 6020	Silver/6010B, 6020	Polychlorinated Biphenyls/8082	Cobalt/6010B, 6020
Cadmium/6010B, 6020	Sodium/6010B	Chlorinated Herbicides/8151A	Copper/6010B, 6020
Calcium/6010B	Thallium/6010B, 6020	Volatile Organic Compounds/8260A, 8260B	Cyanide, Total/335.2(CLP-M)
Selenium/6010B	Vanadium/6010B	n-Hexane/8260A-modified, 8260B-modified	
Iron/6010B	Zinc/6010B, 6020	Aroclor 1268/8082-modified	
Lead/6010B, 6020	Arsenic/6010B, 6020	Chromium, Total/6010B, 6020	

*water only

JAN 19 2012
Date of Certification

JAN 19 2014
Date of Expiration

Director, Ohio Environmental Protection Agency

Manager, Site Assistance & Brownfield Revitalization

SCOPE, LIMITATION, OBLIGATIONS AND RESPONSIBILITIES OF CERTIFICATION ON REVERSE SIDE

Scope. This certificate applies only to the Ohio EPA Voluntary Action Program. The certified laboratory identified herein is authorized to perform analyses in support of no further action letters for the analytes, parameter groups, and methods which are identified on the face of this certificate, so long as this certificate remains effective. The laboratory is prohibited from performing any analyses in support of a no further action letter for any analyte or parameter group, or using any method that is not identified in this certificate. This certificate hereby modifies and supersedes any other Voluntary Action Program certificate issued to the laboratory prior to the date of this certificate. For parameter groups, this certificate authorizes analysis of only those compounds listed in the methods identified herein. This certificate does not authorize for the analysis of compounds which may meet a general criteria or description provided for in such methods, but are not listed.

The laboratory may only perform analysis of Total Petroleum Hydrocarbons when consistent with OAC rule 3745-300-08(B)(3), which refers to BUSTR standards under ORC 3737.882(B), and OAC rule 3745-300-09(C)(2)(b).

Limitation. This certificate does not apply to any other Ohio EPA program nor does it serve any purpose other than that described in the "Scope" section. This certificate is subject to renewal under OAC rule 3745-300-04.

Obligations and Responsibilities. As a condition of certification, the certified laboratory accepts all obligations and responsibilities of a certified laboratory in the Voluntary Action Program, as set forth in ORC Chapter 3746 and OAC Chapter 3745-300, including but not limited to compliance with the standards of performance and conduct for maintaining certification under paragraph (H) of rule 3745-300-04. The certified laboratory must display the original certificate in a prominent location on its premises.

Revocation or Suspension. This certificate is subject to suspension or revocation in accordance with OAC Chapter 3745-300. The authorization provided by this certificate ceases upon the effective date of the suspension or revocation.

This certificate is the property of Ohio EPA and must be surrendered to Ohio EPA upon the expiration, revocation, or suspension of the laboratory's certification.

Ohio Environmental Protection Agency

OHIO E.P.A.

DEC 21 2011

ENTERED DIRECTOR'S JOURNAL

Lassiter 12-21-11

Division of Environmental Response and Revitalization
Voluntary Action Program

Under the authority of Ohio Revised Code Section 3746.04(B)(6) and Ohio Administrative Code Rule 3745-300-04

Certifies

ALS Laboratory Group, Environmental Division (Cincinnati)
4380 Glendale-Milford Road
Cincinnati, Ohio 45242

as a

Certified Laboratory

(Number CL0022)

for the following analytes, parameter groups, and methods:

Aluminum/6010B	Chromium, Total/6010B	Zinc/6010B	Volatile Organic Compounds/8260A, 8260B, TO15
Antimony/6010B	Cadmium/6010B	Cyanide, Total/335.2(CLP-M)	Semi-Volatile Organic Compounds/8270C**
Arsenic/6010B	Manganese/6010B	Asbestos**	Organochlorine Pesticides/8081A
Barium/6010B	Mercury7470A*, 7471A	Naphthalene/TO15-modified	Polychlorinated Biphenyls/8082
Cobalt/6010B	Nickel/6010B	Dichlorodifluoromethane/TO15-modified	Total Petroleum Hydrocarbons, Light Distillates/8015A-modified
Copper/6010B	Silver/6010B	Trichlorofluoromethane/TO-15-modified	Total Petroleum Hydrocarbons, Middle & Heavy Distillates/8015B
Iron/6010B	Selenium/6010B	Acetone/TO15-modified	Ethyl acetate/TO15-modified
Lead/6010B	Thallium/6010B	cis-1,2-Dichloroethene/TO15-modified	Tetrahydrofuran/TO15-modified
Beryllium/6010B	Vanadium/6010B	trans-1,2-Dichloroethene/TO15-modified	Cyclohexane/TO15-modified

*water only

** See "Scope" section on the back of this certificate for restrictions

DEC 21 2011
Date of Certification

DEC 21 2013
Date of Expiration

Director, Ohio Environmental Protection Agency

Manager, Site Assistance & Brownfield Revitalization

SCOPE, LIMITATION, OBLIGATIONS AND RESPONSIBILITIES OF CERTIFICATION ON REVERSE SIDE (Certificate 1 of 2)

Scope. This certificate applies only to the Ohio EPA Voluntary Action Program. The certified laboratory identified herein is authorized to perform analyses in support of no further action letters for the analytes, parameter groups, and methods which are identified on the face of this certificate, so long as this certificate remains effective. The laboratory is prohibited from performing any analyses in support of a no further action letter for any analyte or parameter group, or using any method that is not identified in this certificate. This certificate hereby modifies and supersedes any other Voluntary Action Program certificate issued to the laboratory prior to the date of this certificate. For parameter groups, this certificate authorizes analysis of only those compounds listed in the methods identified herein. This certificate does not authorize for the analysis of compounds which may meet a general criteria or description provided for in such methods, but are not listed.

This certificate authorizes the laboratory to perform analysis of Asbestos in accordance with its accreditation under the National Institute of Standards and Technology (NIST), National Voluntary Laboratory Accreditation Program (NVLAP). The laboratory's authorization to perform analysis of Asbestos under this certificate is conditioned on continued accreditation under NIST NVLAP. This certificate also authorizes the laboratory to perform analysis of Asbestos on soil and water media under the Voluntary Action Program in accordance with the accreditation, standard operating procedure (SOP) ENV-005 (eff. date February 6, 2004) and ENV-004 (Rev. 1, eff. date December 18, 2009), and any SOP revisions the laboratory requests and receives prior approval under OAC 3745-300-04(G) for analysis of Asbestos.

This certificate authorizes the laboratory to perform analyses on air and soil gas media for Semi-Volatile Compounds, as well as, soil and water media. This certification is conditioned on the laboratory performing the analyses in accordance with the method listed on the front of the certificate and the laboratory's approved SOP approved for such analyses (and any SOP revisions for which the laboratory requests and receives prior agency approval under OAC 3745-300-04(G) for such analyses.)

The laboratory may only perform analysis of Total Petroleum Hydrocarbons when consistent with OAC rule 3745-300-08(B)(3), which refers to BUSTR standards under ORC 3737.882(B), and OAC rule 3745-300-09(C)(2)(b).

Limitation. This certificate does not apply to any other Ohio EPA program nor does it serve any purpose other than that described in the "Scope" section. This certificate is subject to renewal under OAC rule 3745-300-04.

Obligations and Responsibilities. As a condition of certification, the certified laboratory accepts all obligations and responsibilities of a certified laboratory in the Voluntary Action Program, as set forth in ORC Chapter 3746 and OAC Chapter 3745-300, including but not limited to compliance with the standards of performance and conduct for maintaining certification under paragraph (H) of rule 3745-300-04. The certified laboratory must display the original certificate in a prominent location on its premises.

Revocation or Suspension. This certificate is subject to suspension or revocation in accordance with OAC Chapter 3745-300. The authorization provided by this certificate ceases upon the effective date of the suspension or revocation.

This certificate is the property of Ohio EPA and must be surrendered to Ohio EPA upon the expiration, revocation, or suspension of the laboratory's certification.

Q. S. L. Lasseter 12-21-11

Ohio | Environmental Protection Agency

OHIO E.P.A.

DEC 21 2011

ENTERED DIRECTOR'S JOURNAL

Division of Environmental Response and Revitalization
Voluntary Action Program

Under the authority of Ohio Revised Code Section 3746.04(B)(6) and Ohio Administrative Code Rule 3745-300-04

Certifies

ALS Laboratory Group, Environmental Division (Cincinnati)
4388 Glendale-Milford Road
Cincinnati, Ohio 45242

as a

Certified Laboratory

(Number CL0022)

for the following analytes, parameter groups, and methods:

Bromodichloromethane/TO15-modified
4-Methyl-2-pentanone/TO15-modified
Dibromochloromethane/TO15-modified
1.2-Dibromoethane/TO15-modified
1,3,5-Trimethylbenzene/TO15-modified
1,2,4-Trimethylbenzene/TO15-modified
1,3-Dichlorobenzene/TO15-modified
1,2-Dichlorobenzene/TO15-modified

DEC 21 2011
Date of Certification

DEC 21 2013
Date of Expiration

Director, Ohio Environmental Protection Agency

Manager, Site Assistance & Brownfield Revitalization

SCOPE, LIMITATION, OBLIGATIONS AND RESPONSIBILITIES OF CERTIFICATION ON REVERSE SIDE (Certificate 2 of 2)

Scope. This certificate applies only to the Ohio EPA Voluntary Action Program. The certified laboratory identified herein is authorized to perform analyses in support of no further action letters for the analytes, parameter groups, and methods which are identified on the face of this certificate, so long as this certificate remains effective. The laboratory is prohibited from performing any analyses in support of a no further action letter for any analyte or parameter group, or using any method that is not identified in this certificate. This certificate hereby modifies and supersedes any other Voluntary Action Program certificate issued to the laboratory prior to the date of this certificate. For parameter groups, this certificate authorizes analysis of only those compounds listed in the methods identified herein. This certificate does not authorize for the analysis of compounds which may meet a general criteria or description provided for in such methods, but are not listed.

Limitation. This certificate does not apply to any other Ohio EPA program nor does it serve any purpose other than that described in the "Scope" section. This certificate is subject to renewal under OAC rule 3745-300-04.

Obligations and Responsibilities. As a condition of certification, the certified laboratory accepts all obligations and responsibilities of a certified laboratory in the Voluntary Action Program, as set forth in ORC Chapter 3746 and OAC Chapter 3745-300, including but not limited to compliance with the standards of performance and conduct for maintaining certification under paragraph (H) of rule 3745-300-04. The certified laboratory must display the original certificate in a prominent location on its premises.

Revocation or Suspension. This certificate is subject to suspension or revocation in accordance with OAC Chapter 3745-300. The authorization provided by this certificate ceases upon the effective date of the suspension or revocation.

This certificate is the property of Ohio EPA and must be surrendered to Ohio EPA upon the expiration, revocation, or suspension of the laboratory's certification.

Environmental
Protection Agency
John R. Kasich, Governor
Mary Taylor, Lt. Governor
Scott J. Nally, Director

December 22, 2011

Certified Mail
91 7108 2133 3937 1506 6335

Ms. Tracey Earle
Quality Assurance Manager
ALS Laboratory Group, Environmental Division
4388 Glendale-Milford Road
Cincinnati, Ohio 45242

Re: Renewal of Certification under Ohio's Voluntary Action Program

Dear Ms. Earle:

Upon review of your laboratory's application for renewal of its certification under Ohio's Voluntary Action Program, I am pleased to inform you that the laboratory meets the applicable requirements. Therefore, the Director of the Ohio Environmental Protection Agency (the "Director") has renewed the laboratory's certification under the authority of Ohio Revised Code ("ORC") 3746.04(B)(6) and Ohio Administrative Code ("OAC") 3745-300-04. Your laboratory certification number remains CL0022.

You are hereby notified that this action of the Director is final and may be appealed to the Environmental Review Appeals Commission (the "Commission") pursuant to ORC Section 3745.04. The appeal must be in writing and set forth the action complained of and the grounds upon which the appeal is based. The appeal must be filed with the Commission within thirty (30) days after notice of the action. The appeal must be accompanied by a filing fee of $70.00 made payable to "Treasurer, State of Ohio" which the Commission, in its discretion, may reduce if by affidavit it is demonstrated that payment of the full amount of the fee would cause extreme hardship. Notice of the filing of the appeal shall be filed with the Director within three (3) days of filing with the Commission. Ohio EPA requests that a copy of the appeal be served upon the Ohio Attorney General's Office, Environmental Enforcement Section. An appeal may be filed with the Commission at the following address:

Environmental Review Appeals Commission
77 South High Street
17th Floor
Columbus, OH 43215

The certification is effective for the analytes, parameter groups and methods listed on the attached laboratory certificates. The certification will expire on the expiration date given on the laboratory certificates, unless renewed in accordance with OAC 3745-300-04. Thank you for your interest in the Voluntary Action Program.

given on the laboratory certificates, unless renewed in accordance with OAC 3745-300-04. Thank you for your interest in the Voluntary Action Program.

Sincerely,

Amy Yersavich
Manager
Site Assistance and Brownfield Revitalization

encl. (2)

cc: VAP file

BURGESS & NIPLE

STANDARD OPERATING PROCEDURE (SOP)
FOR MASTER LIST

REVISION 4

MARCH 2012

Revised by: [signature] Date: 3/21/2012

Reviewed by: J. Scott Dailey Date: 3/21/2012

Approved by: J. Scott Dailey Date: 3/21/2012

PREPARED BY:

BURGESS & NIPLE, INC.
ENGINEERS • ENVIRONMENTAL SCIENTISTS • GEOLOGISTS
5085 REED ROAD
COLUMBUS, OHIO 43220

MASTER LIST OF SOPs

SOP Name	Prepared by	Revision	Date
Groundwater Sampling	B. Smith/M. Leone	4 - M. Akins	February 2011
Soil Sampling	C. Everett	11 - M. Akins	March 2012
Chain-of-Custody	M. Leone	Initial	January 2001
Field Meter Operation & Maintenance	C. Everett	5 - M. Akins	February 2011
Decontamination	M. Leone	1 - M. Akins	February 2011
Monitoring Well Installation	M. Leone	1 - B. Smith	December 2009
Investigative Derived Waste Handling	J. Carpenter	Initial	September 2005
Bulk Asbestos Sampling	Jim Ridgeway	2 - R. Fitch	November 2011
Lead Based Paint (Chip) Sampling	Jim Ridgeway	2 - M. Akins	November 2011
Soil Gas And Air Sampling With SUMMA® Canisters TEDLAR® Bags	Scott Dailey	1 – M. Akins	November 2011
Low-Level Mercury Sampling	B. Smith	1 – M. Akins	November 2011

BURGESS & NIPLE

STANDARD OPERATING PROCEDURE (SOP)
FOR SOIL SAMPLING

REVISION 11

MARCH 2012

Revised by: ______________ Date: 3/21/2012

Reviewed by: J. Scott Dailey Date: 3/21/2012

Approved by: J. Scott Dailey Date: 3/21/2012
Section Director

PREPARED BY:

BURGESS & NIPLE, INC.
ENGINEERS • ENVIRONMENTAL SCIENTISTS • GEOLOGISTS
5085 REED ROAD
COLUMBUS, OHIO 43220

TABLE OF CONTENTS

1.0 PROCEDURAL SECTION

1.1 Scope and Application

This sample collection procedure is to be used when collecting soil samples obtained using direct-push, hollow-stem-auger, and hand-auger soil boring methods, as well as surface grab sampling. This procedure is not suitable for collection of other media types, specifically surface water, groundwater, sediment, sludge, or ambient-air vapors.

1.2 Summary of Methods

Soils are collected using a procedure that minimizes the possibilities of outside contamination, cross-contamination, and dilution of the sample by contaminant volatilization.

1.3 Definitions

- Sampling device – Refers to a sampling method, i.e., Geoprobe, Earthprobe, hollow-stem-auger (HSA) drill rig, hand-auger, shovel, and other sampling devices.
- ASTM - American Society for Testing and Materials.
- SOP – Standard Operating Procedure.
- PID – Photoionization detector (same as organic vapor meter [OVM]).
- OSHA – Occupational Safety and Health Administration.
- PPE – Personal protective equipment.
- QA – Quality Assurance.
- QC – Quality Control.
- VOC – Volatile Organic Compounds.

- VAP - Voluntary Action Program.
- VOA - Volatile organic analysis.
- QA/QC - Quality Assurance/Quality Control.

1.4 Health and Safety Warnings

- Appropriate Personal protective equipment (PPE) will be chosen depending on the known site conditions. Latex or nitrile protective gloves will be used when handling soil samples.
- A hard-hat and steel-toed boots are required when working around any drilling equipment.

1.5 Cautions

Soil samples must be placed into a cooler chilled to 4 degrees Celsius (° C) immediately after collection.

1.6 Personnel Qualifications

- Personnel must be able to accurately describe soils in the manner prescribed by American Society for Testing and Materials (ASTM) Standard D-2488.
- Personnel must be able to operate the Photoionization detector (PID) meter (SOP for Field Meter Operation and Maintenance).
- Personnel must be able to direct the operator of the sampling device or operate the sampling device themselves.
- Personnel must be 40-hour OSHA certified and annual 8-hour refresher training.

1.7 Apparatus and Materials

- Ziploc®-type plastic storage bags.
- Glass soil jars with Teflon-lined lids for collection of laboratory samples.
- EnCore® sampling apparatus and T-Handle or Terracore®.
- Decontaminated stainless steel soil tray and spoon (SOP for Decontamination).
- Calibrated PID (SOP for Field Meter Operation and Maintenance).
- Latex or nitrile protective gloves and other appropriate PPE.

1.8 Instrument Calibration

Burgess & Niple, Inc. (B&N) personnel or an authorized manufacturer's representative will calibrate PID instruments each day of field use (SOP for Field Meter Calibration).

1.9 Sample Collection

Soil samples collected from core sampling apparatuses (i.e., direct-push acetate liners, split-spoon samplers, etc.) for VOC analysis for this U.S. Environmental Protection Agency (EPA) project will be collected using the soil sample collection methods described in Section 1.10 or Section 1.11 of this SOP. Packing soil into a sample jar with zero headspace will be avoided and will only be considered a viable sampling option for VOC soils samples collected from a hand auger or test pit when the soil sampling methods described in Section 1.10 and Section 1.11 of this SOP are not suitable.

The on-site geologist will examine the soil sample upon collection and describe the interval on a field boring log or in the field notebook. The description will be based on ASTM D-2488 standards for soil descriptions.

Each sample will be collected using surgical latex or nitrile gloves, discarded or decontaminated (SOP for Decontamination) after each sample collection. Soil sampling methods for VOC analysis will be completed first and prior to soil sampling methods for non-VOC analysis such as utilizing stainless steel trays, spoons, and/or spatulas to homogenize each soil interval and for transferring the samples to sample jars. The VOC aliquot will not be homogenized to prevent volatilization of potential VOCs present in the soil and therefore a potential false negative analysis. The VOC aliquot will be collected directly from the sampler, taking pieces of soil from the entire interval in order to provide the most representative sample possible.

A composited soil sample will be collected from the sampling interval, placed in a plastic zippered bag, and allowed to warm to ambient temperature (considered greater than 40 degrees Fahrenheit [° F]). The plastic zippered bag will be filled approximately one-half full of composited soil and will be sealed for a minimum of 15 minutes prior to field screening. The tip of the properly calibrated PID intake probe (see B&N's SOP for Field Meter Calibration) will be inserted into the sealed plastic bag after the suitable time and temperature has been achieved for potential volatile organic vapors to be released into the sealed bags headspace. The highest PID reading will be recorded for each soil sample interval. Note that a PID meter is not to be used for quantitative purposes, only to qualitatively determine whether organic vapors are present.

At the end of each boring, a decision will be made as to which sample(s) to submit to the laboratory for chemical analysis. Generally, one soil sample per sample location boring will be analyzed, although the on-site geologist may submit additional samples at his/her discretion. In general, samples will be selected based on the following order:

- Elevated PID readings.
- The first saturated zone encountered.
- A zone that appears anomalous to the other samples collected within the soil boring, i.e., discoloration of soil, unusual odor, a change in soil type, etc.;
- Zone of regulatory compliance (Voluntary Action Program [VAP] industrial, residual, etc.).

1.10 Sample Collection for VOC Analyses Using EnCore® Samplers

- Each sample will be collected using surgical latex or nitrile gloves, discarded or decontaminated (SOP for Decontamination) after each sample collection.

- Upon opening the soil collection apparatus (i.e., direct-push acetate liner, split-spoon sampler, etc.), the core will be field screened with a PID.

- Cupping one's hand over the soil core (to help prevent loss of volatizing compounds), a calibrated PID meter will be run the length of the core under the cupped hand, as to maximize volatilizing compounds.

- After noting PID readings on the field forms, a decision will be made as to which sample(s) to submit to the laboratory for chemical analysis. Generally, one soil sample per sample location boring will be analyzed, although the on-site geologist may submit additional samples at his/her discretion. In general, samples will be selected based on the following order:

  - Elevated PID readings.

  - The first saturated zone encountered.

  - A zone that appears anomalous to the other samples collected within the soil boring, i.e., discoloration of soil, unusual odor, a change in soil type, etc.

  - Zone of regulatory compliance (VAP industrial, residual, etc.).

- A dedicated EnCore® sampling device (coring body) will be placed into the decontaminated T-Handle sampling apparatus (provided with the EnCore® sampling devices.)

1.10.1 Preparing the Coring Body

- Depress the locking lever on the EnCore® T-Handle, placing the coring body (plunger-end first) into the open end of the T-Handle, making sure to align the two slots on the coring body with the locking pins of the T-Handle. Twist the coring body clockwise to lock pins in the slots. Check to make sure the sampler is locked in place.

1.10.2 Collecting the Sample

- Using the T-Handle, push the EnCore® sampler into the soil core until the coring body is completely full. The sampler is considered full when the small o-ring is centered in the T-Handle viewing hole. Remove sampler from the soil, wiping excess soil from the core body exterior. Three EnCore® sample tubes should be collected per sample location.

1.10.3 Capping the Sample

- Cap the core body while still in the T-Handle by pushing the cap over the flat area of the ridge and twist to lock cap in place.

- Place the sampler in the appropriately labeled sampler Ziploc®-type bag (provided with sampling apparatus) and place on ice in a cooler for sample delivery.

1.11 Preserved Volatile Organic Analysis (VOA) Vials (Field Chemical Preservation)

- Approved coring devices include the Terra Core™, EasyDraw Syringe™ and PowerStop Handle™, the Purge-and-Trap Soil Sampler™, the Lock N' Load™, Soil Sample Took, and a cut plastic syringe.

- A portable digital scale capable of weighing to 0.1 grams should be used.

- The portable digital scale should be calibrated daily according to the manufacturer's specifications prior to field activities. After calibrating the scale, a standard weight should be used to verify the scale is accurate to within +/- 0.05 grams.

- On the day of the field activities, weigh the pre-tared methanol-preserved VOA vials to verify that no preservative has escaped. All weights must be recorded to within 0.05 grams with a digital field scale. The VOA vials containing reagent water do not require weighing prior to sample collection.

- Samples are field preserved with 5 milliliters (mL) of reagent water and with 5 mL of methanol.
- A package containing the following bottles are supplied for each field sample location for VOC or gasoline range organics (GRO) analysis:
    - Two preweighed VOA vials containing 5 mL of reagent water and magnetic stir bar;
    - One preweighed VOA vial containing 5 mL of methanol and one 2 ounce or 4 ounce soil jar with no preservative.
- If both VOC and GRO analysis is to be tested for, the following bottles are supplied for each field sample location:
    - Four preweighed VOA vials containing 5 mL of reagent water and magnetic stir bar;
    - One preweighed VOA vial containing 5 mL of methanol and one 2 ounce or 4 ounce soil jar with no preservative.
- Discard all methanol-preserved VOA vials with unacceptable preservative loss of greater than 0.05 grams.
- Record the weight of the methanol-preserved VOA vials in the field log book.
- Assemble the subcoring device pursuant to the manufacturer's instructions.
- Push the coring device into a freshly exposed soil surface. Continue pushing until the soil column inside the coring device has forced the device's plunger to the stopping point and until the appropriate amount of soil has been collected, which is approximately 5 grams (+/- 0.5 grams).
- Each core should be collected as quickly as possible.

- Use a paper towel to quickly wipe the exterior of the coring device to remove excess soil.

- Insert the end of the coring device into the pre-tared VOA vial and eject the soil sample into the vial by pushing on the plunger of the coring device. Avoid splashing the preservative out of the VOA vial by holding the VOA vial at an angle. The mouth of the coring device should not contact the preservative.

- Use a paper towel to quickly wipe the VOA vial threads to remove excess soil and cap, hermetically sealing the vial. The proceeding three steps should be done within 2 minutes to prevent VOC loss.

- Gently swirl the soil sample in the VOA vial to mix and breakup the soil aggregate until the soil is covered with the preservative. The swirling of the VOA vial should not allow the soil to contact the polytetrafluoroethylene (PTFE) septum. The PTFE septum must remain free of soil to allow for the analysis of the sample through the septum.

- Re-weigh the methanol-preserved VOA vials to determine the weight of the soil sample. The VOA vials containing reagent water solution do not require weighing after sample collection.

- Using the pre-adhered label on the vial, complete the label information as needed. The VOA vials as supplied from the laboratory or a certified vendor will be pre-labeled. No additional labeling of the VOA vial should be done that might alter the weight of the sample container. If necessary, a label can be applied to the exterior of the plastic bag containing the vial.

- Place the VOA vial into a resealable plastic bag and place the package into a cooler chilled to 4° C. The VOA vials should be transported to the laboratory in an upright position whenever possible.

- As needed, collect a soil sample for the measurement of the dry weight of the soil. The sample does not need chemical preservation and can be collected in either a 2 ounce or 4 ounce sealable glass jar.

1.12 Handling and Preservation

- Soil that has been accumulated from drilling and sampling activities must be disposed of properly. Soil that is known or suspected to be contaminated above health risked-based levels will be containerized and disposed of in the appropriate manner. Soil that has not been impacted can be disposed of on the ground.

- All soil samples will be handled while wearing appropriate protective gloves.

- All laboratory samples will be kept in a cooler chilled to 4° C until delivered to the laboratory.

- VOC and/or GRO soil samples collected within EnCore® samplers or VOA vials preserved with reagent water must be preserved by the laboratory within 48 hours of sample collection.

All coolers will be packed with cushioning materials prior to shipment to the laboratory in order to prevent breakage of sample containers. Field personnel will insert proper chain-of-custody documentation into each cooler of sample when shipping to the laboratory (SOP for Chain of Custody).

1.13 Data Management and Records Management

- The on-site geologist will log all soil descriptions on a field boring log or field notebook, along with any other pertinent information.

- Field personnel will follow proper chain-of-custody procedures (SOP for Chain of Custody).

- All field paperwork will be delivered to the appropriate project data manager upon completion of field sampling activities.

2.0 QUALITY ASSURANCE AND QUALITY CONTROL SECTION

2.1 Field Quality Assurance

- The field geologist will collect one duplicate soil sample per ten soil samples for quality assurance/quality control (QA/QC) purposes.

- The field geologist will collect one equipment blank per day during sampling for QA/QC purposes. The equipment blank will be collected by passing laboratory grade deionized water over the sampling equipment and collecting the rinseate in a container for laboratory analysis. An equipment blank should be collected for each group of analytes, i.e., metals, VOCs, etc.

- A trip blank will be placed into each cooler containing bottles for VOC analysis by the laboratory prior to shipping. The trip blank will consist of a set of laboratory prepared pre-preserved vials that are not opened, and shipped to the field and then back to the lab for analysis.

2.2 Laboratory Quality Assurance

- The analytical laboratory used to perform the chemical analysis of soil samples will require documentation of QA/QC practices as required by the governing regulations of a specific project.

3.0 REFERENCE SECTION

The procedures documented above have largely been duplicated from the following guidance documents:

Technical Guidance Manual for Hydrogeologic Investigations and Ground Water Monitoring (Ohio EPA, February 1995 or approved newer sections).

American Standard Testing Method D-2488: Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).

Guidance Document for the Implementation of U.S. Environmental Protection Agency Method 5035: Methodologies for Collection, Preservation, Storage, and Preparation of Soils to be Analyzed for Volatile Organic Compounds (Department of Toxic Substances Control California Environmental Protection Agency, November 2004).